The

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IN THIS ISSUE:

TREATMENT OF KIDNEY DISEASE AND HYPERTENSIVE VASCULAR DISEASE WITH RICE DIET, III

Vol. 6 February, 1945 No. 2

TABLE OF CONTENTS, PAGE IV

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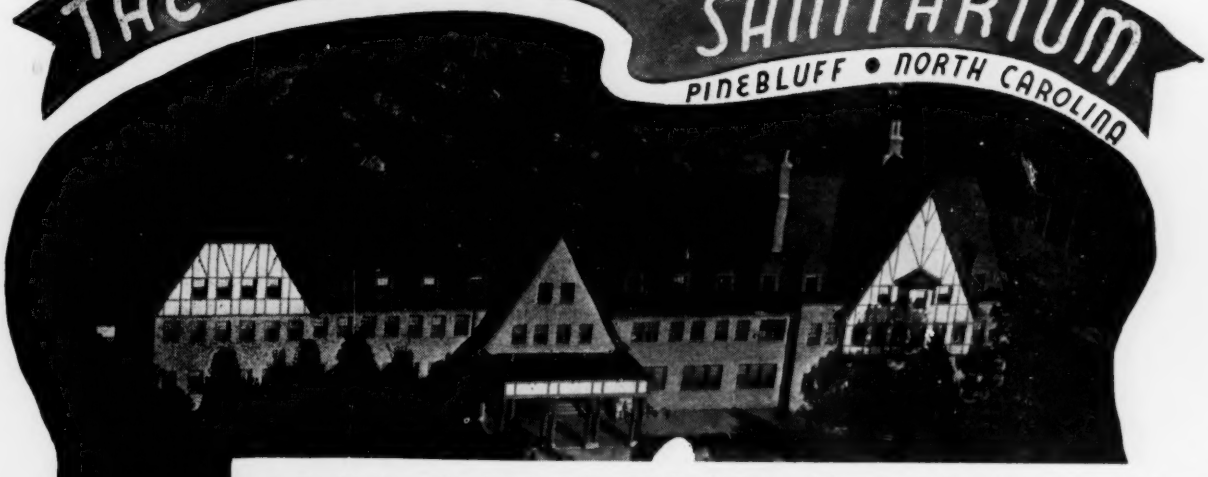

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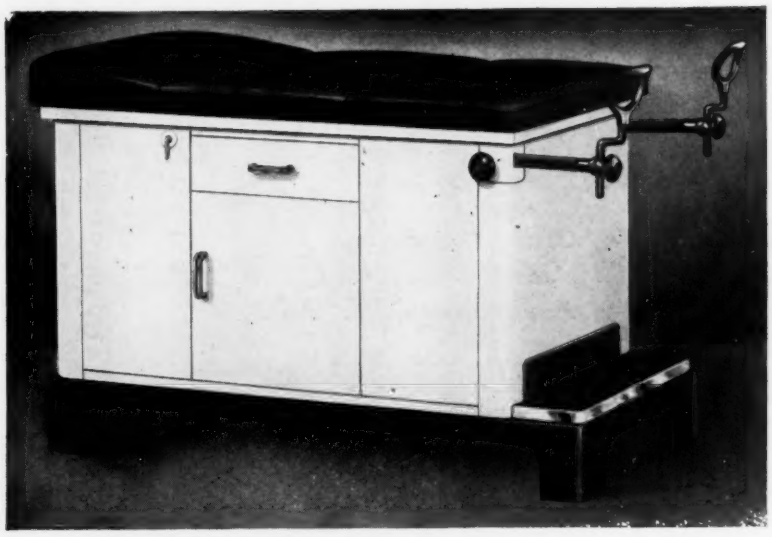

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CONTENTS

ORIGINAL ARTICLES

Compensation of Renal Metabolic Dysfunction: Treatment of Kidney Disease and Hypertensive Vascular Disease with Rice Diet, III —Walter Kempner, M.D. 61

The Treatment of Fractures of the Humerus with the Hanging Cast—R. Beverly Raney, M.D. 88

A Simple Method of Fracture Fixation with the Kirschner Wire—Donnell B. Cobb, M.D., F.A.C.S. 92

Narcolepsy, with Report of Four Cases —F. T. Harper, M.D. 96

Thumbnail Sketches: The Evolution of the Aseptic Principle in Surgery. II. Antony van Leeuwenhoek, *"Father of Bacteriology"* 98

EDITORIALS

State Society Meeting Postponed 100

Have the Armed Forces Crippled Medical Education? 100

British Doctors and Compulsory Insurance . 101

A Layman Looks at Doctors 102

Diamond Anniversary of the Raleigh Academy of Medicine 102

Major Edward T. Harrison 102

CASE REPORTS

Clinico-Pathological Conference, Duke Hospital 103

TUBERCULOSIS ABSTRACT

106

CORRESPONDENCE

107

MEDICOLEGAL ABSTRACT

108

BULLETIN BOARD

Secretary's Message 108

Minutes of Meetings of the Executive Committee, Legislative Committee, and Committee to Advise with Members of the Governor's Commission to Extend Medical and Hospital Care in North Carolina 108

News Notes from the State Board of Health 111

News Notes from the North Carolina Tuberculosis Association 111

County Societies 111

News Notes 111

Announcements 114

AUXILIARY

112

BOOK REVIEWS

112

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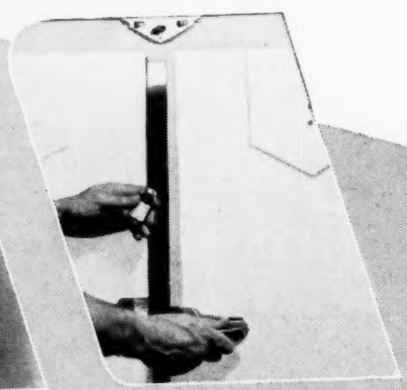

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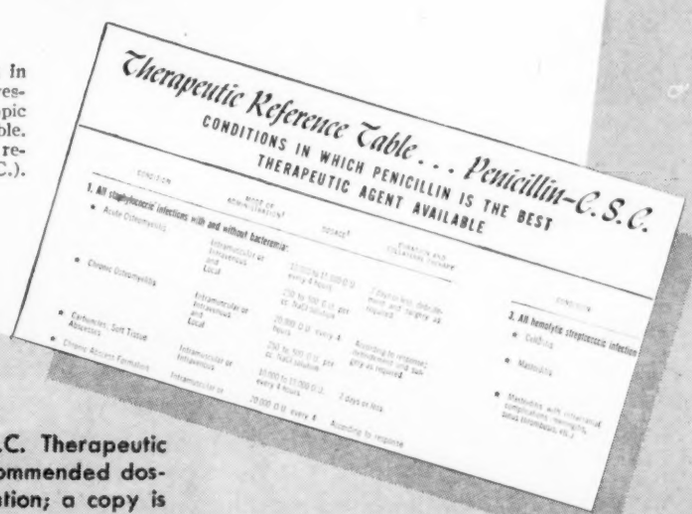
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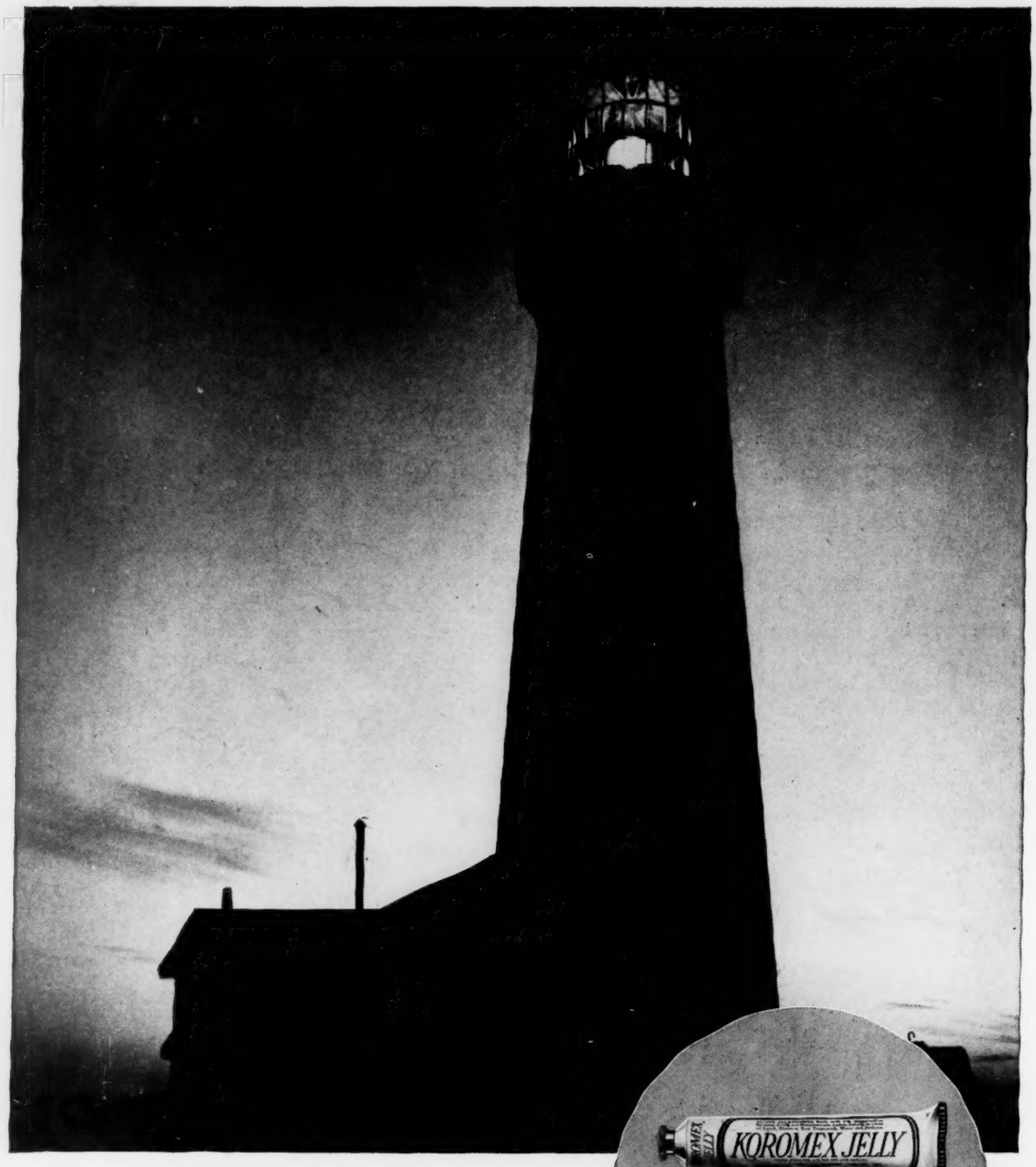

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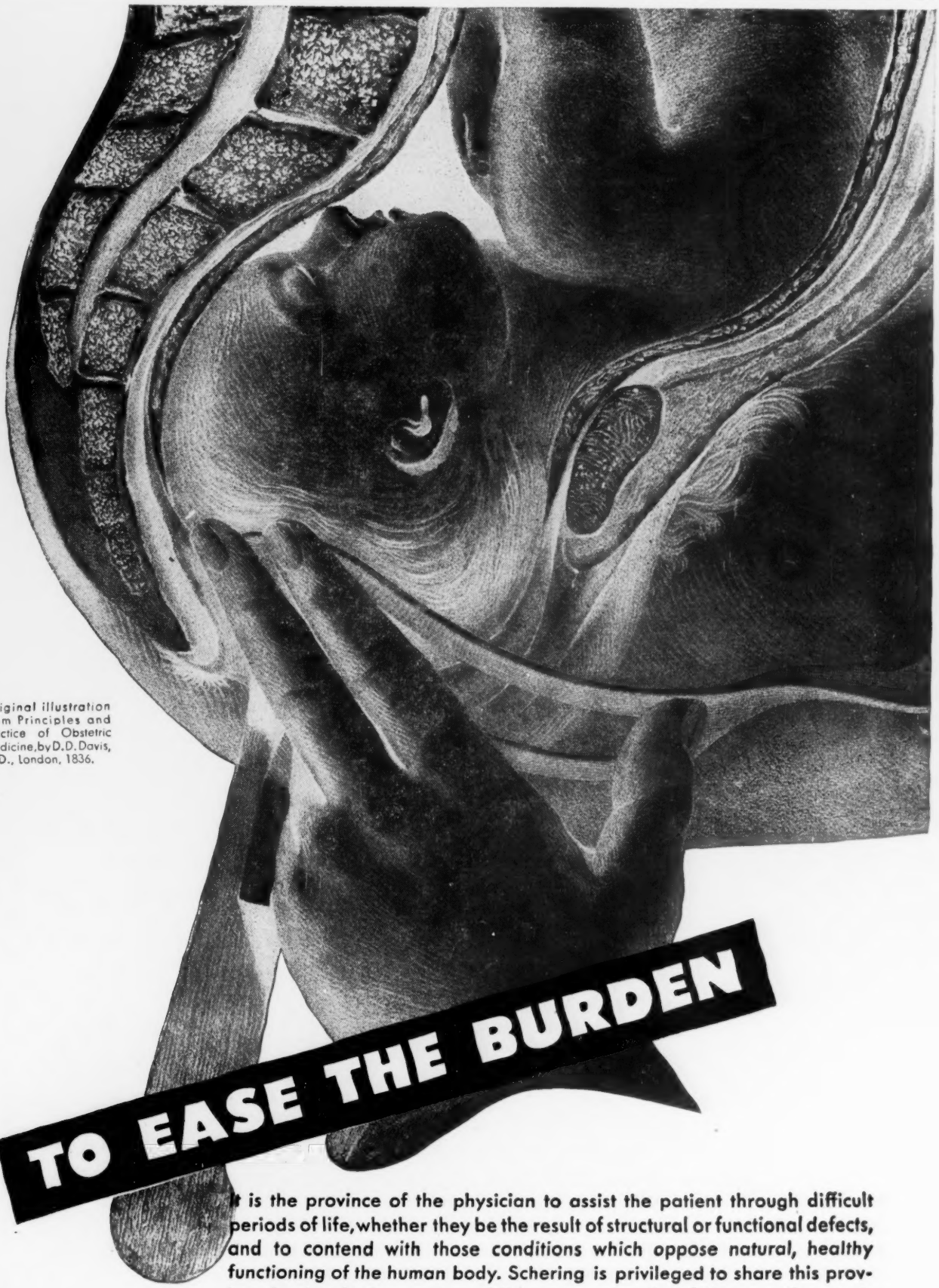

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**Laryngoscope, Feb. 1935, Vol. XLV, No. 2, 149-154. Laryngoscope, Jan. 1937, Vol. XLVII, No. 1, 58-60. Proc. Soc. Exp. Biol. and Med., 1934, 32, 241. N. Y. State Journ. Med., Vol. 35, 6-1-35, No. 11, 590-592.*

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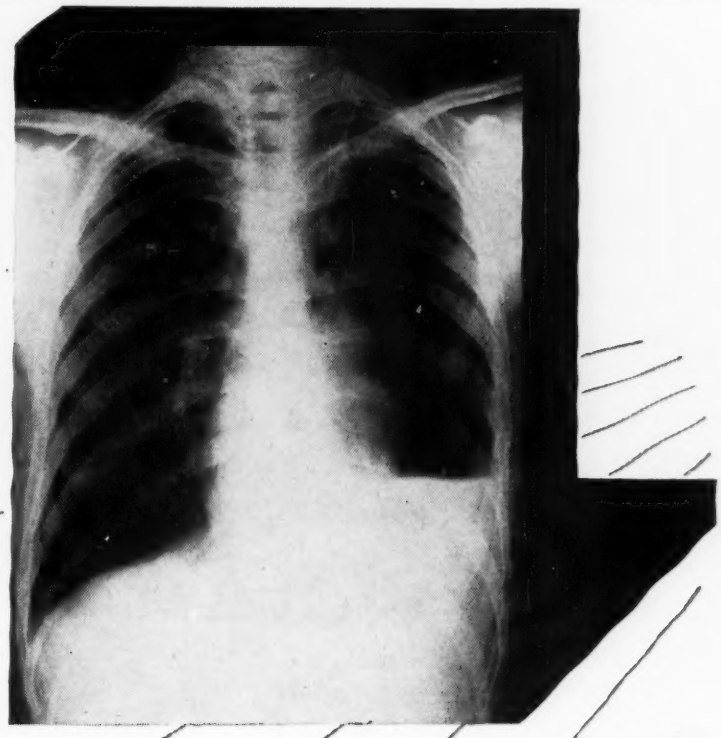

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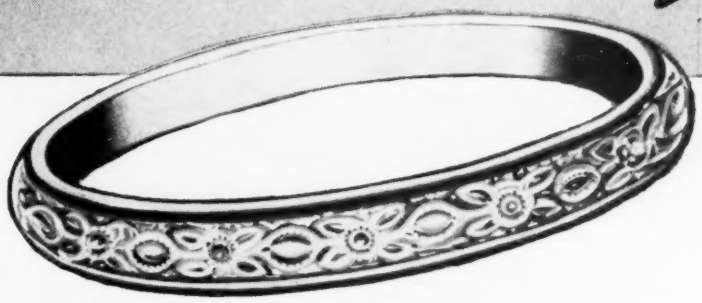

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*Reiter, P. J., Experience with Benzedrine, Ugeskr. f. laeger, 99:459-460, 1937.

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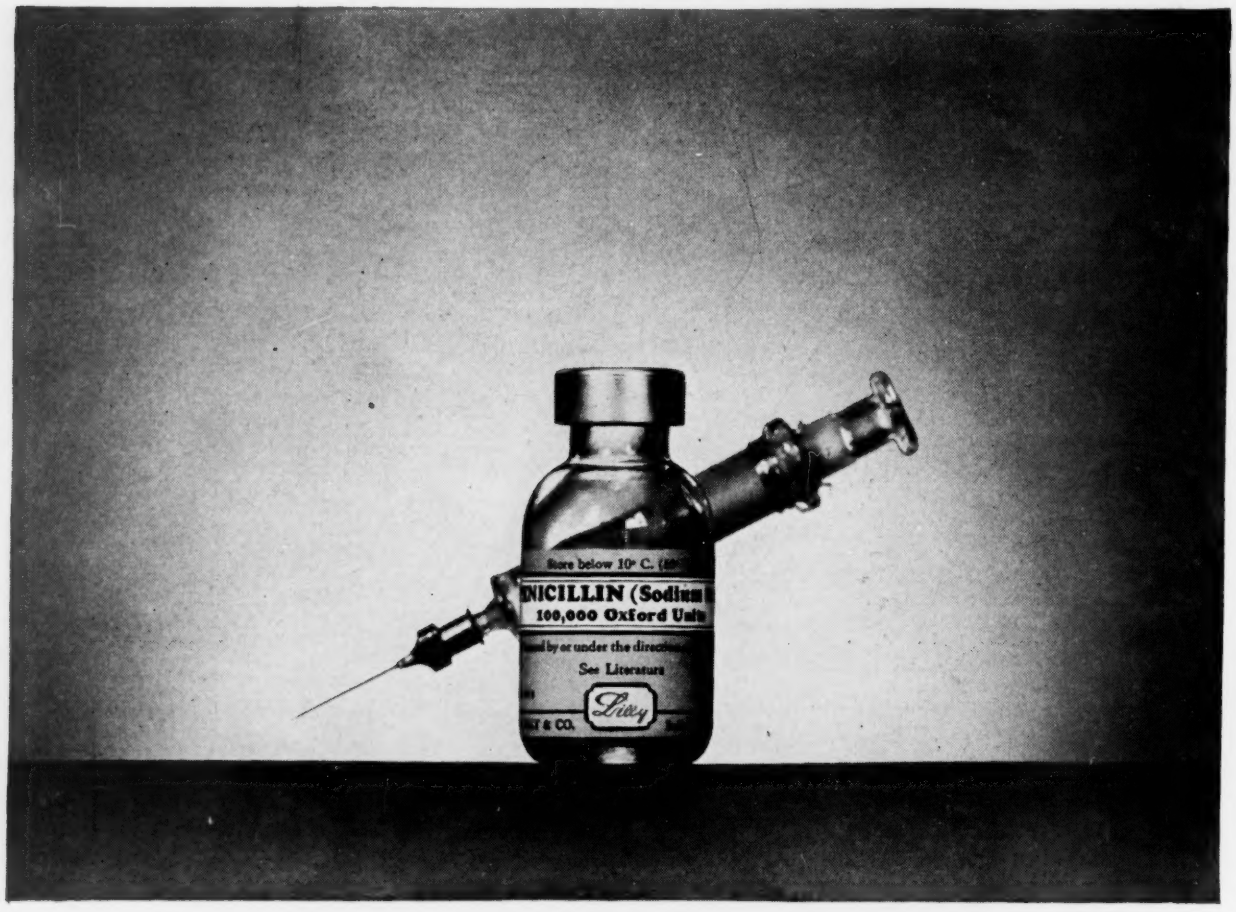

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VOLUME 6 FEBRUARY, 1945 NUMBER 2

COMPENSATION OF RENAL METABOLIC DYSFUNCTION

Treatment of Kidney Disease and Hypertensive Vascular Disease with Rice Diet, III

WALTER KEMPNER, M.D.

DURHAM

In kidney disease, there may be impairment of both the *excretory* and the *metabolic* functions of the kidney, or of either one alone.

In previous papers[1], experiments with the Warburg technique were published which show that the metabolic reactions of surviving isolated kidney cells—for example, deamination of amino acids, formation of ammonia, oxidation of keto-acids — can be altered quantitatively or qualitatively, reversibly or irreversibly (as by changes in the oxygen concentration of the cell milieu). On the basis of these experiments, the impairment of the renal *metabolic* function was emphasized as an important factor in conditions such as uremic azotemia and acidosis.

This view seems to be supported by clinical observation. Two case histories may serve as examples. A 21 year old girl with mercury bichloride poisoning, who subsequently made a very good recovery, was completely anuric for four days, and from the fifth to the seventh day passed an average of only 128 cc. of urine per day. In spite of the very limited excretion (a total of 385 cc. of urine in seven days), the nonprotein nitrogen, which was measured daily during these seven days, averaged only 87 mg. per 100 cc. of blood and was never higher than 120 mg. (on the seventh day). The second patient, who subsequently died, had chronic glomerulo-nephritis. He had a urine output of 1200-1500 cc. per day, but his nonprotein nitrogen was more than 200 mg. per 100 cc. of blood.

In the first patient, there was no impairment of the *metabolic* function of the kidney, though the *excretion* of urine was almost completely suppressed. There was no rise in blood pressure, no retinopathy. In the second patient, the *excretory* function of the kidney was relatively satisfactory; with a protein intake of about 20 Gm. in twenty-four hours, the urinary excretion in twenty-four hours was 3.7 Gm. of urea nitrogen, 5 Gm. of total nitrogen. The *metabolic* function of the kidney, however, was inadequate, and there resulted hypertension, retinopathy and a nonprotein nitrogen level considerably higher than that of the first patient, whose urinary nitrogen excretion was 0.

That renal excretory insufficiency does not play a decisive role in the production of renal hypertension was shown by the experimental work of Goldblatt[2]. Constriction of the main renal arteries may cause persistent hypertension without disturbance of renal

From the Department of Medicine, Duke University School of Medicine, Durham, N. C.

1. Kempner, W.: (a) Anoxemia of the Kidney as a Cause of Uremic Acidosis: Inhibitory Effect of Low Oxygen Tension on the Deamination of Amino Acids in Kidney Tissue, Am. J. Physiol. 123:117-118 (July) 1938; (b) Verminderter Sauerstoffdruck in der Niere als Ursache der "reversiblen" uraemischen Acidose, Klin. Wchnschr. 17:971-973 (July 9) 1938; (c) Inhibitory Effect of Low Oxygen Tension on the Deamination of Amino Acids in the Kidney, J. Biol. Chem. 124:229-235 (June) 1938; (d) The Role of Oxygen Tension in Biological Oxidations, Cold Spring Harbor Symposia on Quantitative Biology 7:269-283. New Bedford, Mass., The Darwin Press, 1939.

2. (a) Goldblatt, H., Lynch, J., Hanzal, R. F., and Summerville, W. W.: Studies on Experimental Hypertension I, J. Exper. Med. 59:347-379 (March) 1934; (b) Goldblatt, H.: Experimental Hypertension Induced by Renal Ischemia; Harvey Lecture, Bull. New York Acad. Med. 14:523-553 (Sept.) 1938.

excretory function. In some of the experimental hypertensive animals which had no apparent renal excretory insufficiency, degenerative disease of the retinal arterioles developed.

If, for the moment, we disregard the renal *excretory* function and consider the kidney only as an organ of *metabolism* we can assume, as a basis for experimental approach, that pathological conditions in the kidney *may* lead to the following changes:

(a) Substances which are normally removed by the kidney cell metabolism may increase in amount in the blood or tissue fluids.

(b) Substances which are normally produced by the kidney cell metabolism may decrease in amount.

(c) Some of the substances normally metabolized by the kidney cells may be metabolized vicariously by the liver cells, with a resulting increase in the metabolic products of the liver cells[1b,d;3].

(d) "Abnormal" substances may appear in blood or tissue fluids which under physiological conditions exist only in an intermediary, non-apparent phase of the kidney cell metabolism, since normally they are immediately further metabolized to harmless end products.

If we assume that some of these "abnormal" substances which appear when the metabolic function of the kidney cells is disturbed are "harmful" and play a role either directly or indirectly in the development of hypertension, vascular retinopathy, encephalopathy, heart lesions, and new kidney disease, the *working hypothesis* suggests itself: That the ordinary mixed diet may contain constituents which increase the production of these "abnormal," harmful substances by the diseased kidney cells.

Starting from this *working hypothesis*, we have tried to compensate renal metabolic dysfunction by replacing the ordinary mixed diet with a diet limited to rice, sugar, fruit and fruit juices, supplemented by vitamins and iron[4].* The purpose of this paper is to describe the effects obtained with this rice-fruit-sugar diet. The therapeutic possibilities and limitations of similar diets or diet combinations will not be discussed here.

It is not a new experience that special diets are burdensome, and require the faithful cooperation of physician and patient. The rice-fruit-sugar diet is certainly no exception, but it must be repeated that "if there is a choice between an unpleasant diet on the one side and cardiac failure, uremia, encephalopathy or blindness on the other side, the diet is the lesser evil."[4b]

The rice-fruit-sugar diet, which, for the sake of brevity, will be referred to as "the rice diet," contains in 2000 calories about 20 Gm. of protein, 5 Gm. of fat, 460 Gm. of carbohydrate, 0.2 Gm. of sodium and 0.15 Gm. of chloride. Patients with marked hypochloremia, or with symptoms of salt deprivation, are given extra sodium chloride in small amounts, or hydrochloric acid. The fluid intake is usually limited to 700-1000 cc. of fruit juices per day (no water).

Dry rice contains about 350 calories per 100 Gm. The average patient can eat 300 Gm., or 10 ounces daily, which will provide about 1050 calories; the remaining 900 or 1000 calories must be supplied by the liberal use of sugar and fresh or preserved fruits. All fruits are allowed, with the exception of nuts, dates, avocados, and any dried or canned fruit, or fruit derivatives, to which substances other than sugar have been added. *No salt is permitted.* All fruit juices are allowed, but tomato or vegetable juices are not. Brown or white sugar may be used *ad libitum.* Any kind of rice is used. The rice is boiled or steamed in plain water or fruit juices, without salt, milk or fat.

The palatability of rice depends to some extent upon the way in which it is cooked. Patients, of course, vary in their tastes; some prefer it dry, each grain standing apart, while others prefer it rather wet. If ordinary white rice is used, it may be added slowly to boiling water and boiled for about twenty minutes, then drained in a colander, washed with hot water, and either served at once or steamed for fifteen or twenty minutes. If wet rice is preferred, the washing with hot water is omitted. A little ingenuity in the use of sugar, sliced and preserved fruits, and so forth, will be rewarded. Some patients who object to the sweet taste find the use of lemon juice helpful. Most patients accustom themselves to the rice diet, and some even like it.

3. Kempner, W.: Discussion note, Clinico-Pathological Conference, North Carolina M. J. 4:227-228 (June) 1943.

4. Kempner, W.: (a) Treatment of Kidney Disease and Hypertensive Vascular Disease with Rice Diet, North Carolina M. J. 5:125-133 (April); (b) 273-274 (July) 1944.

*The patient should receive daily as minimal doses: Vitamin A, 5000 units; vitamin D, 1000 units; thiamine chloride, 5 mg.; riboflavin, 5 mg.; niacinamide, 25 mg.; calcium pantothenate, 2 mg.; ferrous sulfate, 0.6 Gm.

It is not unusual for the weight to decrease more or less markedly during the first twenty days. The reason for this weight loss may be that the amount of food given does not cover the caloric requirements; in such cases, the amount of food must be increased, unless reduction of weight is indicated. Another reason may be that the patient does not eat the full amount of his diet during the first period of adjustment. The most frequent cause is the loss of visible or invisible edema; one patient with marked edema, for example, lost 63 pounds within the first sixteen days on the diet.

During the first few weeks of the rice regime hospitalization greatly facilitates the study and treatment of the patient, but rest in bed, unless the severity of the disease demands it, is neither necessary nor desirable.

A great number of patients on the rice diet have experienced marked relief from giddiness, headache, mental sluggishness and depression, and easy fatigability. Such *subjective* improvement has not been accepted as evidence of successful therapy; only *objective* results, such as loss of edema and changes in urine and blood chemistry findings, in blood pressure, eyegrounds, heart size, and electrocardiograms, have been used to determine the effect of the treatment.

For some of the patients who had shown satisfactory improvement, the diet, after a time, was modified by the addition of nonleguminous vegetables or small amounts of potatoes, lean beef, chicken, fish, or eggs (everything prepared without salt or fat). This was usually done on the insistence of the patient. It must be borne in mind, however, that even these slight modifications change the character of the diet and may spoil the entire effect. Where a critical condition of kidney, heart or retina exists, any compromise may be too much, and the patient may have to pay for the few exceptions made with the reappearance of all the signs and symptoms of the disease. In such cases, the strict diet should be continued indefinitely, just as liver is continued in pernicious anemia and insulin in diabetes.

It must, however, be emphasized that even in the less serious cases the "modified" rice diet, though still preferable to other diets of low protein, fat and salt content, cannot replace in effectiveness the strict rice diet and should be used with caution. Each patient, preferably while in the hospital, should be individually "regulated" on the modified diet by being allowed only so much additional food as he can take without reacting unfavorably with changes in blood pressure, heart size, electrocardiogram, nonprotein nitrogen, and so forth. This will be further illustrated in the case histories and charts.

The diet was used in the treatment of 213 patients in whom *insufficiency of the metabolic function of the kidney* either was evident or could not be ruled out. Eighty-three patients had "primary" kidney disease (7 patients acute glomerulonephritis, 73 chronic glomerulonephritis, chronic pyelonephritis, or nephrolithiasis, 2 lupus erythematosus, and 1 polycystic kidney disease). One hundred and thirty patients were listed under the diagnosis of "hypertensive vascular disease"; 67 of them showed no conclusive evidence of renal *excretory* dysfunction, 63 had definite "secondary" kidney involvement—that is, one or several of the following findings: phenolsulfonphthalein excretion in two hours below 50 per cent, urea clearance below 50 per cent, nonprotein nitrogen above 40 mg. per 100 cc. of blood, more than 0.8 Gm. of albumin per 1000 cc. of urine, range in specific gravity (concentration-dilution test) of less than 0.012, 5 red blood cells or 3 granular casts per high power field. The diet was used for periods varying from four days to thirty-two months; after two to five months some of the modifications listed were permitted in most cases.

The diet has been ineffective in 75 of the 213 patients treated (35 per cent), if we judge according to rigid standards and include 27 patients who were in a critical condition when started on the diet and who died after an average period of twenty-five days. In 138 of the 213 patients (65 per cent) the diet has proved to be beneficial. In no instance has it been harmful; careful medical supervision, however, including control of blood and urine chemistry, is essential.

Protein Requirements of Patients on Rice Diet

We were afraid that the small amount of protein contained in the rice diet would lead to a depletion of the plasma proteins and to a decrease in hemoglobin; but we were willing to take these risks, since we thought that such deficiencies could be corrected at some later stage after the imminent danger of uremic or cardiac death or of blindness had been overcome. The determinations,

however, showed that the rice diet did not cause depletion of the plasma proteins or decrease in the hemoglobin.

Urinary nitrogen excretion

With the reduced protein and high carbohydrate intake of the rice diet, the total nitrogen excretion in the urine decreases to a level considerably below that found in complete fasting. Three hundred and three determinations of the total nitrogen excretion in the urine of 82 patients with kidney disease (whose nonprotein nitrogen was not above 50 mg. per 100 cc. of blood) or with "hypertensive vascular disease," before and after they had received the rice diet for varying periods of time, are summarized in table 1.

TABLE 1
Nitrogen Excretion in Urine

Period on rice diet	*Number of patients*	*Number of determinations*	*Gm. total nitrogen per 1000 cc. of urine (average)*	*Gm. total nitrogen excreted in 24 hours (average)*
0	55	64	7.09	7.60
1-14 days	52	90	5.10	4.83
15-30 days	46	55	3.59	3.60
1-2 months	26	33	3.12	2.93
Over 2 months	32	61	2.26	2.26

In many instances the protein intake before the beginning of the diet had been limited, either because the patients were too ill to eat the full amount of a mixed diet, or because they had received other low protein diets. (The regular hospital diet contains about 65 Gm. of protein.) Consequently, the nitrogen excretion in the urine before the beginning of the rice diet was relatively low, averaging 7.09 Gm. per 1000 cc., 7.6 Gm. in twenty-four hours.

After two months of rice diet, the nitrogen excretion in the urine averaged 2.26 Gm. per 1000 cc., 2.26 Gm. in twenty-four hours. If an allowance of 0.9 Gm. per twenty-four hours is made for the excretion of nitrogen other than that excreted in the urine, the total nitrogen loss in twenty-four hours is about 3.16 Gm. With a daily intake of $3.2 \times 6.25 = 20$ Gm. of protein, these patients are in protein equilibrium.

Plasma proteins

The rice diet does not cause depletion of the plasma proteins. The greatest decrease —from 7.7 to 5.9 Gm. of protein per 100 cc. of plasma—was found after twenty-four weeks of rice diet in a patient with chronic nephritis. This patient had had a number of gastro-intestinal upsets with diarrhea, during which he had been able to eat only part of the diet. (After three weeks of rice diet, the plasma proteins were 6.9 Gm. per 100 cc., after ten weeks 7.6 Gm., after eighteen weeks 6.35 Gm.) The greatest increase —from 5.4 to 7.2 Gm. of protein per 100 cc. of plasma—was found after twenty-two days of rice diet in a patient who was recovering from acute glomerulonephritis with marked edema. The average plasma protein concentration of 120 patients, many of whom were in a critical condition, was:

Before rice diet.....6.3 Gm. per 100 cc. of plasma
After 90 days (average) of rice diet .....6.3 Gm. per 100 cc. of plasma

Hemoglobin

The rice diet does not cause a decrease in the hemoglobin. The average hemoglobin value (per cent of 15.5 Gm.) in 165 patients, including 23 moribund patients with an average nonprotein nitrogen of 138 mg. per 100 cc. of blood, was:

Before rice diet .....79.9 per cent
After 75 days (average) of rice diet....80.1 per cent

The fact that the average values of the plasma proteins and hemoglobin do not decrease on the rice regime, but are maintained at a constant level, is in itself of positive significance when we consider how common progressive hypoproteinemia and progressive anemia are in kidney disease.

Urine Chlorides and Plasma Chlorides of Patients on Rice Diet

With the reduced chloride intake of the rice diet, the chloride excretion in the urine decreases. A typical example is given in table 2.

TABLE 2
Plasma and Urine Chlorides of a Patient on the Rice Diet

Period on rice diet (days)	*Plasma chlorides (milli-equivalents)*	*Urine chlorides (milli-equivalents)*
0 (regular hospital diet)	99	83
0 (regular hospital diet)		73
2		47
4		20.8
10		9
18	95	
21		2.7
26	95	3.2

The lowest urine chloride concentration found in this series (as compared to about 60 to 150 milli-equivalents in a person on a normal diet) was 1.35 milli-equivalents, with a total urinary excretion of 18 mg. of chloride per twenty-four hours, in a patient with "hypertensive vascular disease" without apparent renal excretory dysfunction

who had been on the rice diet for seventy days. The plasma chlorides were 93.1 milli-equivalents (as sodium chloride, 544 mg. per 100 cc. of plasma). The highest plasma chloride concentration found after more than two months of the rice regime was 102.3 milli-equivalents (as sodium chloride, 598 mg. per 100 cc. of plasma) in a patient with chronic nephritis in the nephrotic stage; the urine chloride concentration was about 5.2 milli-equivalents, the total urinary chloride excretion per twenty-four hours, 160 mg.

The average values of 381 determinations of the plasma chlorides in 91 non-uremic patients (nonprotein nitrogen below 75 mg. per 100 cc. of blood) were:

Before rice diet .....97.0 milli-equivalents (as sodium chloride, 567 mg. per 100 cc. of plasma)

After 44 days (average) of rice diet .....91.7 milli-equivalents (as sodium chloride, 536 mg. per 100 cc. of plasma)

The rice diet as such—within the periods studied—does not cause a reduction of the plasma chlorides below the critical level. Since critical hypochloremia, however, is frequent in patients with kidney disease, symptoms such as muscle cramps, increased nervousness, and anorexia must be watched for and the chloride concentration in the plasma must be checked frequently.

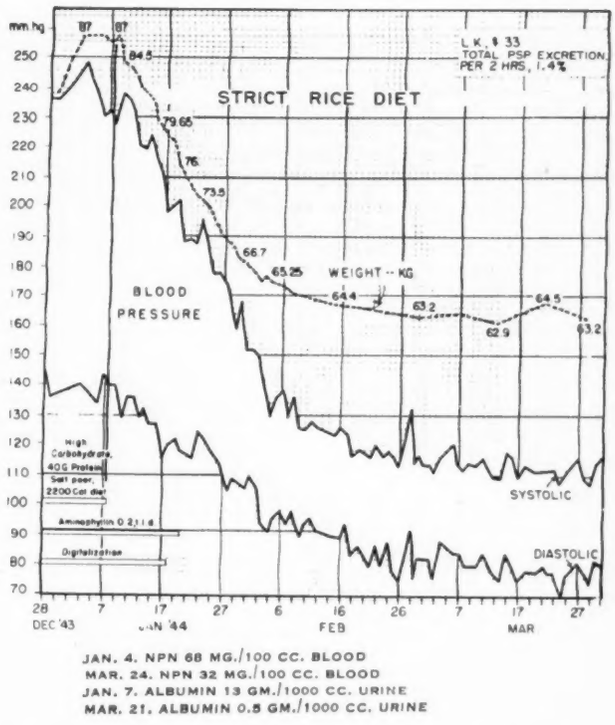


Fig. 1. L.K. (f., 33). Terminal stage of chronic nephritis with cardiorenal failure and uremic pericarditis. No decrease of hypertension and edema after ten days of high carbohydrate, 40 Gm. protein, salt-poor diet, with aminophylline and digitalis. Decrease of blood pressure to normal and loss of 50 pounds of edema on rice diet.

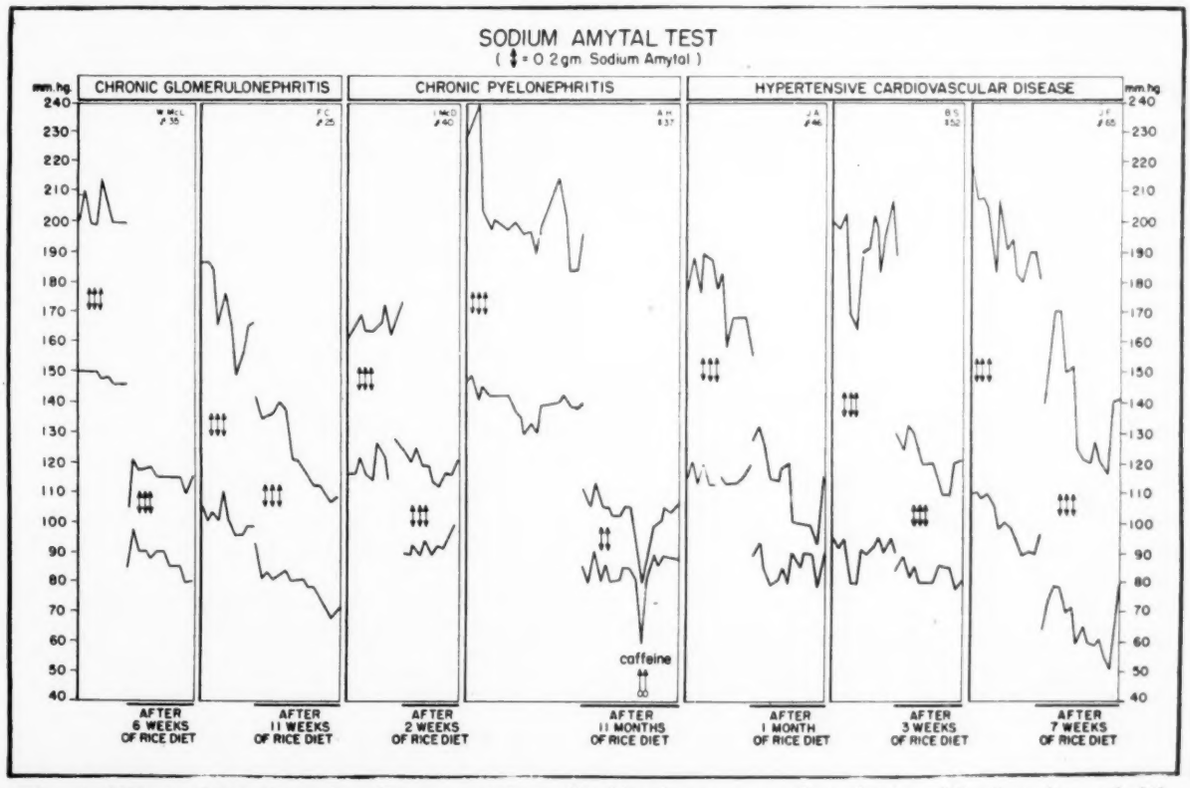

SODIUM AMYTAL TEST
(↕ = 0.2 gm. Sodium Amytal)
mm.hg
CHRONIC GLOMERULONEPHRITIS
CHRONIC PYELONEPHRITIS
HYPERTENSIVE CARDIOVASCULAR DISEASE
caffeine
AFTER 6 WEEKS OF RICE DIET
AFTER 11 WEEKS OF RICE DIET
AFTER 2 WEEKS OF RICE DIET
AFTER 11 MONTHS OF RICE DIET
AFTER 1 MONTH OF RICE DIET
AFTER 3 WEEKS OF RICE DIET
AFTER 7 WEEKS OF RICE DIET

Fig. 2. Effect of 0.6 Gm. of sodium amytal on the blood pressure of patients with chronic nephritis and "hypertensive vascular disease" before and after rice diet.

Hypertension

One hundred and ninety-two patients[5] with hypertension (115 males, 77 females), aged 8 to 75 (average 41 years), were treated with the strict or modified rice diet. Five patients had acute glomerulonephritis, 57 patients chronic glomerulonephritis, chronic pyelonephritis, or nephrolithiasis, 1 patient polycystic kidney disease. In 129 patients, the diagnosis of "hypertensive vascular disease" was made; 63 of these patients showed signs of "secondary" kidney involvement; in 66, no conclusive evidence of kidney involvement was found.

Eleven patients were not hospitalized and were seen only in the out-patient clinic. One hundred and eighty-one patients received the rice diet in the hospital. A great number of patients were in a hopeless condition when they were started on the diet, and were given as much as they were able to take. Of these, 25 died after six to eighty-one days on the strict diet (average twenty-five days). Of the remaining 156 hospital patients, 42 were on the diet (first admission) for four to fourteen days (average ten days); 114 patients (first admission) for fifteen to eighty-four days (average thirty-one days). Sixty-three of the 156 patients were readmitted to the hospital for one to eight reexaminations and 13 patients were periodically re-examined in the clinic, after continuing the diet (more or less strictly) at home for periods varying from two weeks to five months.

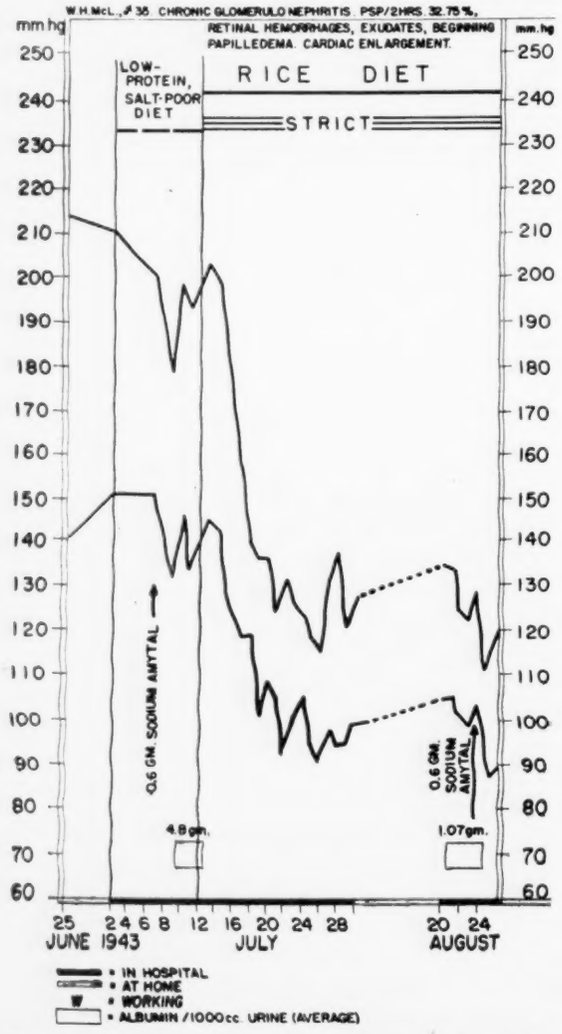


Fig. 3. W.H.McL. (m., 35). Chronic glomerulonephritis. No decrease of hypertension on high carbohydrate, low protein, salt-poor diet. Decrease of blood pressure to normal on rice diet.

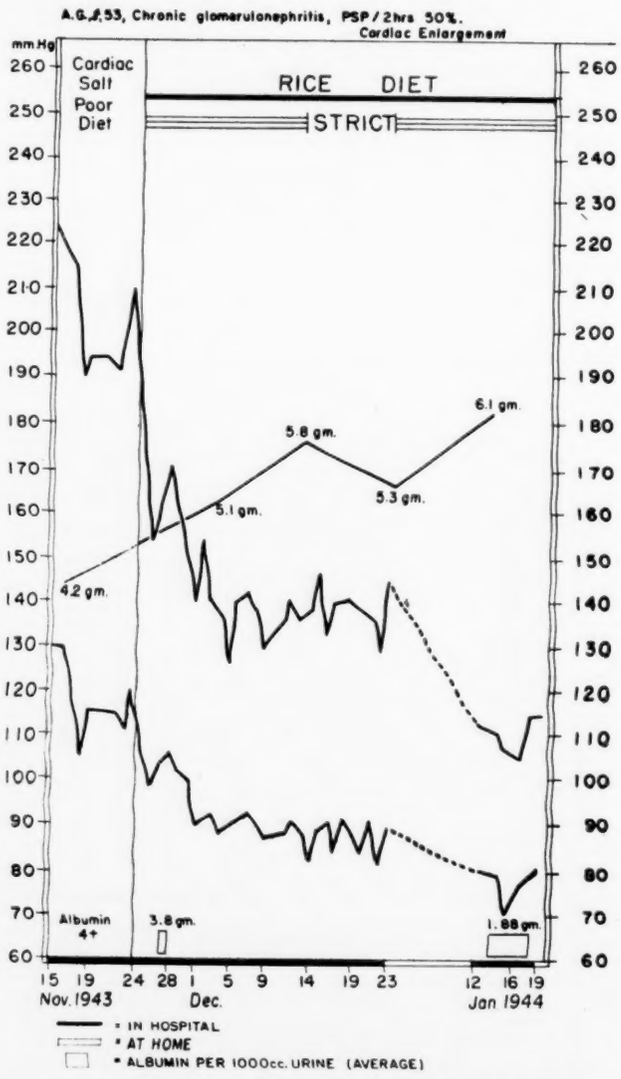


Fig. 4. A.G. (m., 53). Chronic nephritis. No decrease of hypertension after nine days of "cardiac salt-poor" diet. Decrease of blood pressure to normal on rice diet, with increase of plasma proteins.

5. One patient with "hypertensive vascular disease" is not included because the rice diet had been started at home several weeks before the first examination in this hospital.

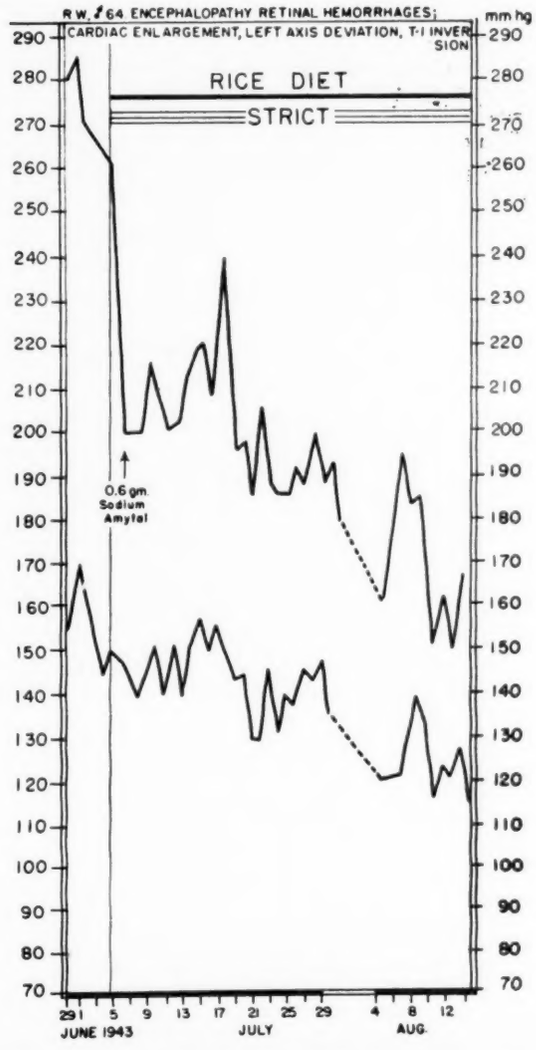


Fig. 5. R.W. (m., 64). "Hypertensive vascular disease." No decrease of hypertension after five days of 60 Gm. protein hospital diet. Decrease of blood pressure on rice diet.

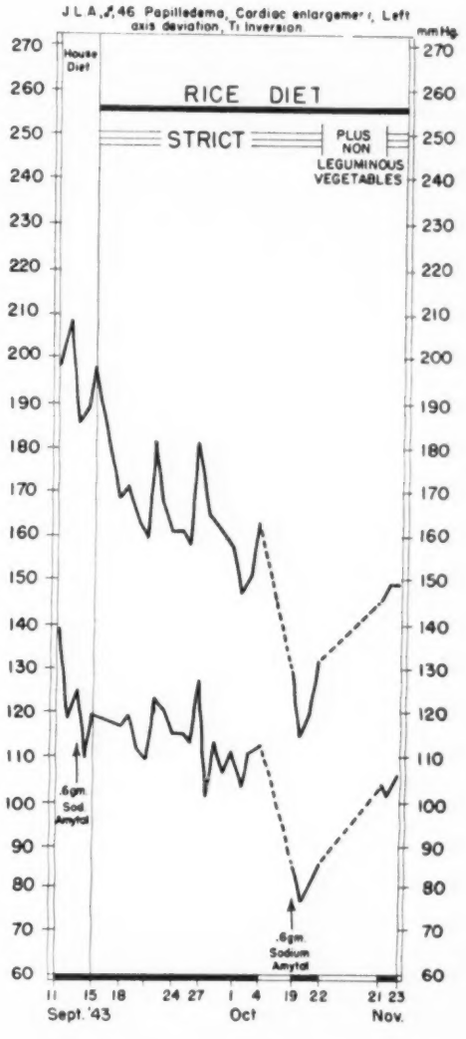


Fig. 6. J.L.A. (m., 46). "Hypertensive vascular disease." Decrease of blood pressure to normal on rice diet. Increase of blood pressure on addition of non-leguminous vegetables.

The routine blood pressure readings were taken at about the same time each day by the same examiner, with the patient in a recumbent position and after a period of about twenty minutes' rest. For the sodium amytal test, blood pressure readings were made every hour during the sodium amytal sleep, as well as during a six hour period both before and after it. Six-tenths of a gram of sodium amytal was used for the test.

In 5 patients with *acute glomerulonephritis* and hypertension, the blood pressure decreased from a level of 170 systolic, 109 diastolic (average) to 108 systolic, 66 diastolic (average), within an average period of fifteen days on the rice diet.

Of the 58 patients with hypertension and *chronic glomerulonephritis, chronic pyelonephritis, nephrolithiasis, or polycystic kidney disease,* 11 died after seven to fifty-one days (average thirty days) on the strict rice diet. The initial blood pressure readings in these patients averaged 208 systolic, 137 diastolic.

In 10 of the remaining 47 patients (21 per cent) the hypertension was not improved; the decrease in the mean arterial pressure was less than 20 mm. of mercury, the average blood pressure decreasing from a level of 208 systolic, 132 diastolic to a level of 192 systolic, 124 diastolic after sixty-seven days (average) on the rice diet.

In 37 of the 47 patients (79 per cent) the hypertension was improved, the average blood pressure decreasing from a level of 194 systolic, 124 diastolic to a level of 140 systolic, 96 diastolic after an average of seventy-seven days on the diet. (Table 3).

TABLE 3

EFFECT OF RICE DIET ON BLOOD PRESSURE

	Blood Pressure before Rice Diet (mm. Hg.)	*Blood Pressure after Rice Diet (mm. Hg.)*	*Change in Systolic and Diastolic Blood Pressure (mm. Hg.)*	*Change in Mean Arterial Pressure (mm. Hg.)*	*Days on Rice Diet*
HYPERTENSION ON BASIS OF ACUTE GLOMERULONEPHRITIS					
1.	165/97	103/70	− 62/−27	−44.5	13
2.	167/112	120/55	−47/−57	−52	22
3.	182/107	108/78	− 74/−29	−51.5	23
4.	150/125	95/50	− 55/−75	−65	10
5.	184/104	114/76	− 70/−28	−49	6
Average	**170/109**	**108/66**	**− 62/−43**	**−52.5**	**15**
HYPERTENSION ON BASIS OF CHRONIC GLOMERULONEPHRITIS, CHRONIC PYELONEPHRITIS, NEPHROLITHIASIS, OR POLYCYSTIC KIDNEY DISEASE					
Hypertension not improved (Decrease of mean arterial pressure less than 20 mm. Hg.)					
1.	168/117	152/106	− 16/−11	−13.5	7
2.	202/117	187/112	− 15/− 5	−10	8
3.	209/137	191/130	− 18/− 7	−12.5	12
4.	169/98	148/91	− 21/− 7	−14	19
5.	244/144	210/150	− 34/+ 6	−14	7
6.	211/169	189/156	− 22/−13	−17.5	10
7.	185/115	165/98	− 20/−17	−18.5	7
8.	225/129	210/115	− 15/−14	−14.5	16
9.	240/150	(154/108	− 86/−42	−64	166)
		240/142	0/− 8	− 4	548
10.	228/143	225/139	− 3/− 4	− 3.5	36
Average	**208/132**	**192/124**	**− 16/− 8**	**−12**	**67**
Hypertension improved (Decrease of mean arterial pressure 20-96.5 mm. Hg.)					
1.	250/174	131/100	−119/−74	−96.5	90
2.	189/125	139/100	− 50/−25	−37.5	313
3.	193/118	150/107	− 43/−11	−27	34
4.	169/93	121/77	− 48/−16	−32	20
5.	218/146	125/89	− 93/−57	−75	29
6.	200/140	115/85	− 85/−55	−70	24
7.	167/120	115/81	− 52/−39	−45.5	63
8.	157/111	122/88	− 35/−23	−29	34
9.	171/105	131/72	− 40/−33	−36.5	77
10.	201/130	163/125	− 38/− 5	−21.5	24
11.	277/157	213/121	− 64/−36	−50	25
12.	222/148	179/127	− 43/−21	−32	11
13.	227/135	165/114	− 62/−21	−41.5	20
14.	155/98	128/74	− 27/−24	−25.5	135
15.	202/116	111/78	− 91/−38	−64.5	53
16.	188/111	124/85	− 64/−26	−45	412
17.	172/99	120/86	− 52/−13	−32.5	19
18.	158/107	122/79	− 36/−28	−32	95
19.	228/145	113/79	−115/−66	−90.5	180
20.	166/109	134/88	− 32/−21	−26.5	35
21.	169/110	114/82	− 55/−28	−41.5	55
22.	237/139	117/81	−120/−58	−89	48
23.	222/136	198/120	− 24/−16	−20	23
24.	160/94	120/80	− 40/−14	−27	30
25.	154/111	123/92	− 31/−19	−25	14
26.	200/120	165/112	− 35/− 8	−21.5	12
27.	190/139	120/94	− 70/−45	−57.5	43
28.	180/121	127/83	− 53/−38	−45.5	65
29.	189/136	161/116	− 28/−20	−24	21
30.	257/153	230/130	− 27/−23	−25	240
31.	189/147	161/103	− 28/−44	−36	25
32.	230/160	191/131	− 39/−29	−34	356
33.	165/108	122/92	− 43/−16	−29.5	95
34.	164/89	127/86	− 37/− 3	−20	14
35.	172/103	121/88	− 51/−15	−33	24
36.	210/127	147/97	− 63/−30	−46.5	80
37.	166/115	129/99	− 37/−16	−26.5	9
Average	**194/124**	**140/96**	**− 54/−28**	**−41**	**77**

TABLE 3—Continued

	Blood Pressure before Rice Diet (mm. Hg.)	*Blood Pressure after Rice Diet (mm. Hg.)*	*Change in Systolic and Diastolic Blood Pressure (mm. Hg.)*	*Change in Mean Arterial Pressure (mm. Hg.)*	*Days on Rice Diet*
"HYPERTENSIVE VASCULAR DISEASE" WITH "SECONDARY" RENAL INVOLVEMENT					
Hypertension not improved (Decrease of mean arterial pressure less than 20 mm. Hg.)					
1.	227/155	215/135	— 12/—20	— 16	64
2.	242/151	210/152	— 32/+ 1	—15.5	13
3.	223/130	222/118	— 1/—12	— 6.5	13
4.	229/113	207/102	— 22/—11	—16.5	216
5.	176/103	151/92	— 25/—11	—18	35
6.	240/159	230/159	— 10/ 0	— 5	12
7.	244/147	231/152	— 13/+ 5	— 4	28
8.	186/114	170/110	— 16/— 4	—10	25
9.	196/98	181/95	— 15/— 3	— 9	5
10.	194/133	175/117	— 19/—16	—17.5	32
11.	225/124	216/121	— 9/— 3	— 6	7
12.	211/126	222/134	+ 11/+ 8	+ 9.5	10
13.	233/140	216/144	— 17/+ 4	— 6.5	25
14.	170/110	167/112	— 3/+ 2	— 0.5	4
15.	240/150	225/145	— 15/— 5	—10	19
16.	236/134	206/128	— 30/— 6	—18	19
17.	200/126	194/130	— 6/+ 4	— 1	88
18.	199/148	206/154	+ 7/+ 6	+ 6.5	30
19.	183/94	161/93	— 22/— 1	—11.5	5
20.	222/134	229/145	+ 7/+11	+ 9	18
21.	226/156	209/141	— 17/—15	—16	126
22.	171/96	148/92	— 23/— 4	—13.5	68
Average	**212/129**	**200/126**	**— 12/— 3**	**— 7.5**	**39**
Hypertension improved (Decrease of mean arterial pressure 20-77 mm. Hg.)					
1.	195/121	147/102	— 48/—19	—33.5	67
2.	242/144	176/119	— 66/—25	—45.5	58
3.	179/136	148/114	— 31/—22	—26.5	9
4.	164/100	112/76	— 52/—24	—38	82
5.	240/128	168/91	— 72/—37	—54.5	82
6.	195/120	144/89	— 51/—31	—41	585
7.	210/120	186/101	— 24/—19	—21.5	8
8.	240/140	197/124	— 43/—16	—29.5	57
9.	225/130	153/93	— 72/—37	—54.5	38
10.	200/108	142/69	— 58/—39	—48.5	228
11.	236/156	203/141	— 33/—15	—24	19
12.	188/122	157/106	— 31/—16	—23.5	84
13.	236/120	190/85	— 46/—35	—40.5	59
14.	227/120	189/110	— 38/—10	—24	29
15.	214/138	151/109	— 63/—29	—46	53
16.	204/150	172/108	— 32/—42	—37	34
17.	184/102	136/87	— 48/—15	—31.5	60
18.	211/134	149/111	— 62/—23	—42.5	14
19.	233/138	190/106	— 43/—32	—37.5	79
20.	225/124	159/94	— 66/—30	—48	21
21.	245/139	171/107	— 74/—32	—53	30
22.	235/135	200/110	— 35/—25	—30	17
23.	211/94	128/76	— 83/—18	—50.5	80
24.	251/128	203/121	— 48/— 7	—27.5	81
25.	244/119	193/86	— 51/—33	—42	38
26.	200/129	125/88	— 75/—41	—58	60
27.	220/150	168/118	— 52/—32	—42	31
28.	275/156	155/122	—120/—34	—77	40
Average	**219/128**	**165/102**	**— 54/—26**	**—40**	**73**
"HYPERTENSIVE VASCULAR DISEASE" WITHOUT CONCLUSIVE EVIDENCE OF "SECONDARY" RENAL INVOLVEMENT					
Hypertension not improved (Decrease of mean arterial pressure less than 20 mm. Hg.)					
1.	183/122	171/120	— 12/— 2	— 7	25
2.	200/104	172/101	— 28/— 3	—15.5	21
3.	177/115	166/109	— 11/— 6	— 8.5	12
4.	165/108	148/92	— 17/—16	—16.5	38
5.	203/127	188/115	— 15/—12	—13.5	72
6.	165/107	146/107	— 19/ 0	— 9.5	60
7.	215/124	192/115	— 23/— 9	—16	34

TABLE 3—Continued

	Blood Pressure before Rice Diet (mm. Hg.)	*Blood Pressure after Rice Diet (mm. Hg.)*	*Change in Systolic and Diastolic Blood Pressure (mm. Hg.)*	*Change in Mean Arterial Pressure (mm. Hg.)*	*Days on Rice Diet*
8.	163/106	149/99	− 14/− 7	−10.5	65
9.	225/93	194/86	− 31/− 7	−19	70
10.	190/115	166/104	− 24/−11	−17.5	16
11.	171/107	153/96	− 18/−11	−14.5	134
12.	182/121	154/113	− 28/− 8	−18	10
13.	170/96	158/96	− 12/− 0	− 6	17
14.	163/95	154/92	− 9/− 3	− 6	17
15.	177/96	154/80	− 23/−16	−19.5	18
16.	179/114	158/106	− 21/− 8	−14.5	41
17.	178/104	189/115	+ 11/+11	+11	24
18.	156/103	132/92	− 24/−11	−17.5	8
19.	172/100	146/93	− 26/− 7	−16.5	16
20.	190/107	157/103	− 33/− 4	−18.5	20
21.	185/109	155/100	− 30/− 9	−19.5	4
22.	188/110	168/99	− 20/−11	−15.5	16
23.	163/110	141/100	− 22/−10	−16	24
24.	170/93	150/87	− 20/− 6	−13	4
25.	160/90	138/89	− 22/− 1	−11.5	5
26.	164/118	176/140	+ 12/+22	+17	22
27.	168/92	149/85	− 19/− 7	−13	24
28.	187/128	159/118	− 28/−10	−19	20
Average	**179/108**	**160/102**	**− 19/− 6**	**−12.5**	**30**
Hypertension improved (Decrease of mean arterial pressure 20-66 mm. Hg.)					
1.	171/116	130/84	− 41/−32	−36.5	240
2.	200/155	170/128	− 30/−27	−28.5	26
3.	200/92	148/76	− 52/−16	−34	61
4.	214/118	174/96	− 40/−22	−31	27
5.	235/148	168/118	− 67/−30	−48.5	19
6.	188/114	142/93	− 46/−21	−33.5	56
7.	188/112	158/95	− 30/−17	−23.5	38
8.	207/123	162/96	− 45/−27	−36	19
9.	260/138	204/140	− 56/+ 2	−27	69
10.	214/110	162/96	− 52/−14	−33	20
11.	225/124	162/96	− 63/−28	−45.5	33
12.	158/98	125/82	− 33/−16	−24.5	9
13.	201/129	168/112	− 33/−17	−25	50
14.	215/134	175/134	− 40/− 0	−20	15
15.	246/136	165/97	− 81/−39	−60	38
16.	201/110	145/99	− 56/−11	−33.5	43
17.	165/89	129/79	− 36/−10	−23	256
18.	169/110	132/95	− 37/−15	−26	21
19.	171/95	131/85	− 40/−10	−25	118
20.	154/102	121/83	− 33/−19	−26	14
21.	233/123	177/110	− 56/−13	−34.5	4
22.	165/101	130/84	− 35/−17	−26	51
23.	190/88	145/74	− 45/−14	−29.5	48
24.	215/130	183/114	− 32/−16	−24	32
25.	196/127	164/115	− 32/−12	−22	28
26.	194/112	155/89	− 39/−23	−31	79
27.	194/144	124/82	− 70/−62	−66	21
28.	180/100	126/83	− 54/−17	−35.5	26
29.	200/100	120/84	− 80/−16	−48	4
30.	240/120	200/110	− 40/−10	−25	105
31.	173/103	140/94	− 33/− 9	−21	16
32.	176/112	155/92	− 21/−20	−20.5	29
33.	212/110	142/93	− 70/−17	−43.5	84
34.	162/98	126/81	− 36/−17	−26.5	10
35.	198/122	153/108	− 45/−14	−29.5	22
36.	193/125	139/95	− 54/−30	−42	33
37.	180/99	143/94	− 37/− 5	−21	14
Average	**197/115**	**151/97**	**− 46/−18**	**−32**	**48**

Some results that were important to the individual patient necessarily fail to appear in such a summary. In one patient with chronic nephritis and almost complete blindness, who was moribund when he was started on the diet, the blood pressure decreased from 240 systolic, 150 diastolic to 160 systolic, 110 diastolic within forty days. After five and one half months of diet, the blood pressure was 154 systolic, 108 diastolic, and after fourteen months 155 systolic, 110 diastolic. The eyesight improved so much that the patient could read fine print and was able to resume his work. One would be justified in the conclusion that the diet had a beneficial effect on the course of this patient's nephritis. In the blood pressure and nonprotein nitrogen tables, however, this case had to be listed as a negative result, because at the time of the last examinations (after fifteen to eighteen months of rice diet), following a number of intercurrent infections and an automobile accident which resulted in a fractured pelvis, the blood pressure had again risen to the initial level.

Of the 63 patients on whom the diagnosis of *"hypertensive vascular disease" with "secondary" kidney involvement* was made, 13 died after six to eighty-one days (average twenty days) on the strict rice diet. The initial blood pressure readings in these patients averaged 226 systolic, 150 diastolic.

In 22 of the remaining 50 patients (44 per cent), the hypertension was not improved; the decrease in the mean arterial pressure was less than 20 mm. of mercury, the average blood pressure decreasing from a level of 212 systolic, 129 diastolic to a level of 200 systolic, 126 diastolic in an average time of thirty-nine days.

In 28 of the 50 patients (56 per cent) the hypertension was improved, the average blood pressure decreasing from a level of 219 systolic, 128 diastolic to a level of 165 systolic, 102 diastolic after seventy-three days (average) on the rice diet.

Of 66 patients whose condition was diagnosed as *"hypertensive vascular disease," without conclusive evidence of renal excretory dysfunction,* 1 patient died after thirty-six days on the strict diet. His initial blood pressure average was 248 systolic, 138 diastolic.

In 28 of the remaining 65 patients (43 per cent), the hypertension was not improved; the decrease in the mean arterial pressure was less than 20 mm. of mercury, the average blood pressure decreasing from a level of 179 systolic, 108 diastolic to a level of 160 systolic, 102 diastolic after an average of thirty days on the rice diet.

In 37 of the 65 patients (57 per cent) the hypertension was improved, the average blood pressure decreasing from a level of 197 systolic, 115 diastolic to a level of 151 systolic, 97 diastolic in an average time of forty-eight days.

Since, according to our hypothesis, the rice diet acts by compensating renal metabolic dysfunction, one may assume that in those cases in which the blood pressure decreased under treatment the hypertension was not "essential," but was due to some impairment of the metabolic function of the kidney, even though no conclusive sign of kidney disease could be demonstrated. On the other hand, in the patients who did not respond to the diet (exclusive of those with a too rapid down-hill course and those in whom irreversible anatomical lesions had already taken place), one may assume that the hypertension must have originated not from any renal dysfunction, but from some extra-renal condition. On this premise, it would be advisable (for instance, if sympathectomy is being considered) to use the rice diet as a therapeutic test which, if negative, may help to confirm the diagnosis of "neurogenic" or "essential" hypertension.

Histories 1-10 and figures 1-6, 14, 15, 19-23, 25-30, 33-35, 37-40, 42-44, 46-49, 51-58 illustrate the response of patients with various types of hypertension to the diet.

Electrocardiogram and Heart Size

Cardiac enlargement, inversion of T_1, and left axis deviation are reversible in patients with *acute* nephritis. In patients with *chronic* nephritis and hypertensive vascular disease we expected that the rice regime, at best, might prevent the usual progressive course of the disease, the further increase in heart size, the deeper inversion of T_1, and the greater deviation of the electrical axis.

However, the chest films and electrocardiograms show that, even in chronic nephritis and hypertensive vascular disease, the rice diet may lead to such an improvement of the heart that it may become normal in size and that the inverted T_1 may become upright, and the left axis deviation may disappear. Since we did not anticipate these findings, it is only recently that chest films

and electrocardiograms of every patient have been repeated after treatment, but electrocardiograms of 82 patients and chest films of 72 patients are available for study. None of these patients whose electrocardiograms and chest films are under consideration received digitalis or any other medication.

The 82 patients on whom the electrocardiograms were made received the strict or modified rice diet for one to thirty-two months. All electrocardiograms were made with the patient in a recumbent position.

Electrical axis

In 76 patients, the electrical axis could be evaluated. In the remaining 6 patients $R_1 + S_1$, plus the absolute value of $R_3 + S_3$, was less than 10 mm. An angle of the electrical axis of more than +30 degrees was found:

Before the diet .....in 19 patients
After the diet .....in 31 patients

An angle of the electrical axis of 0 to +30 degrees was found:

Before the diet .....in 29 patients
After the diet .....in 27 patients

An angle of the electrical axis of less than 0 degrees was found:

Before the diet .....in 28 patients
After the diet .....in 18 patients

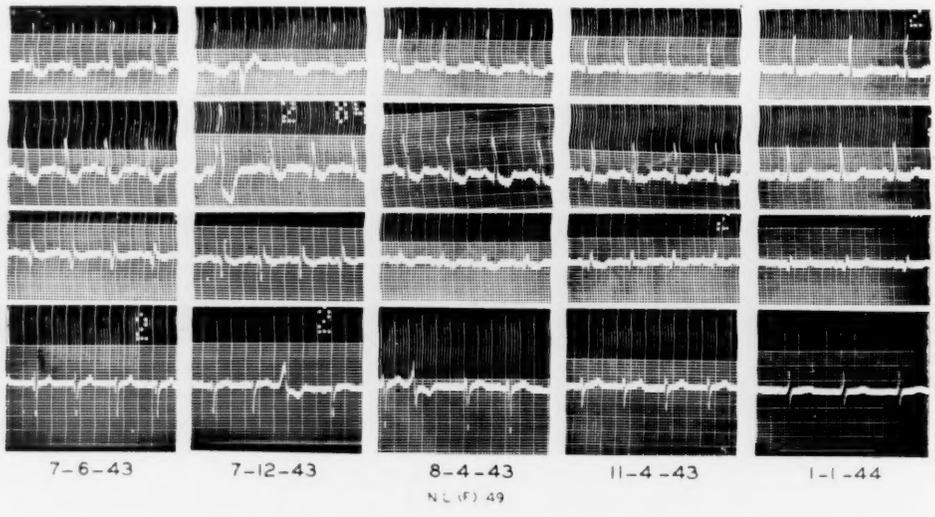


Fig. 7. N.L. (f., 49). "Hypertensive vascular disease." Rice diet since June 29, 1943. No bedrest after September, 1943. No digitalis. Depressed S-T segments have become normal; inverted T_1 has become upright.

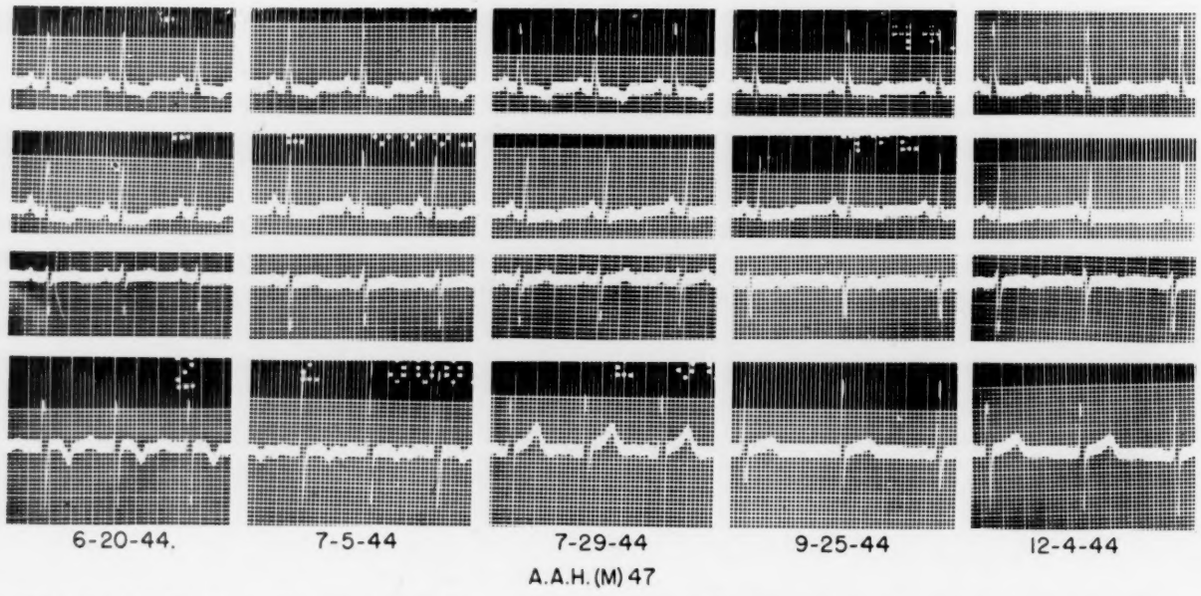


Fig. 8. A.A.H. (m., 47). "Hypertensive vascular disease." Retinopathy with papilledema and exudates. Rice diet since July 4, 1944. Bedrest part of the time. No digitalis. Inverted T_1 has become upright.

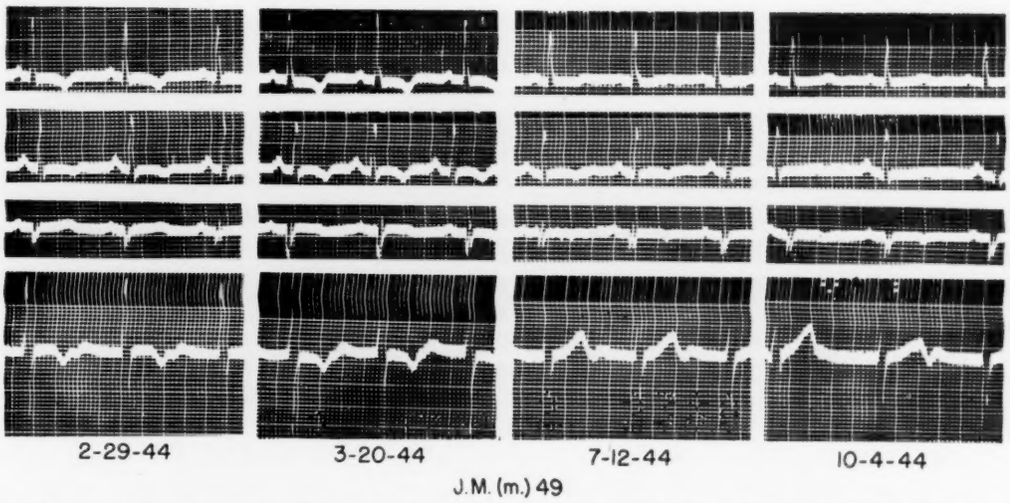


Fig. 9. J.M. (m., 49). "Hypertensive vascular disease." Rice diet since March 10, 1944. No bedrest. No digitalis. Inverted T_1 has become upright.

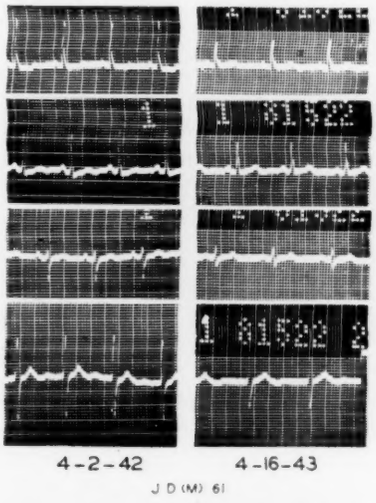


Fig. 10. J.D. (m., 61). "Hypertensive vascular disease." Rice diet since April 13, 1942. No digitalis. No bedrest. Angle of electrical axis has increased from +12° to +40°. Diphasic T_1 has become upright.

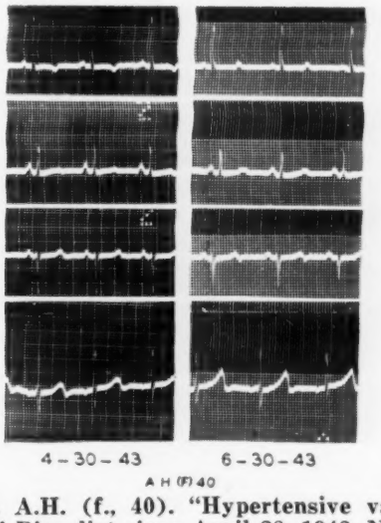


Fig. 11. A.H. (f., 40). "Hypertensive vascular disease." Rice diet since April 28, 1943. No digitalis. Bedrest part of the time. Inverted T_1 has become upright.

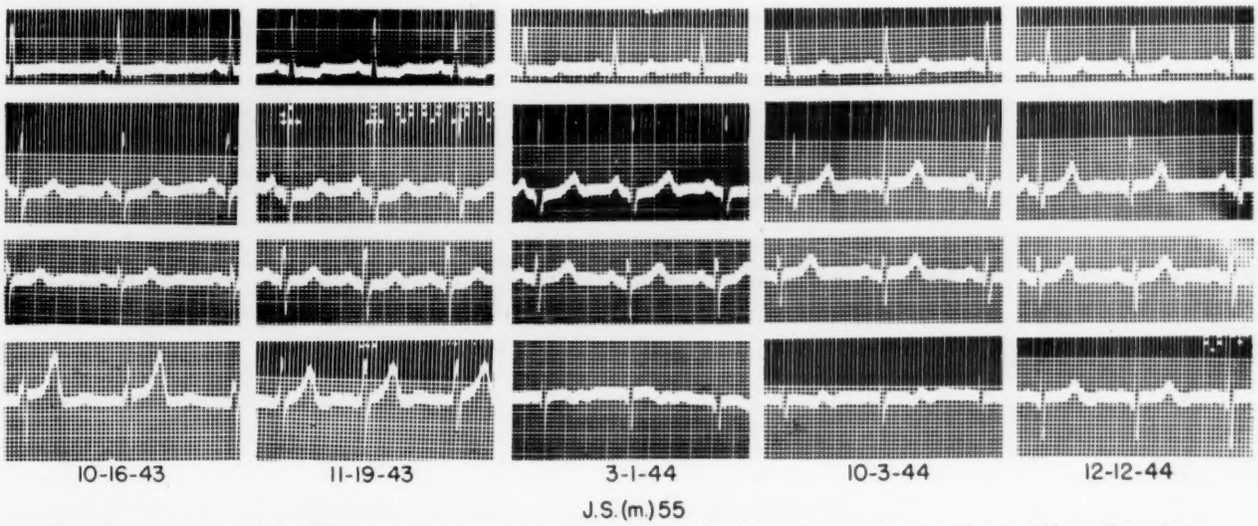


Fig. 12. J.S. (m., 55). "Hypertensive vascular disease." Retinopathy with exudates. Rice diet since October 27, 1943. No bedrest. No digitalis. T_1 flat, then diphasic; has become upright.

In 43 of the 76 patients there were no changes, or only minor changes (less than ±15 degrees) in the electrical axis. In 20 of the 76 patients there was a change in the angle of the electrical axis in the range of +15 to +25 degrees or −15 to −25 degrees. In 13 of the 76 patients there was a change in the angle of the electrical axis of ±26 or more degrees.

TABLE 4

Change in Electrical Axis

Number of patients	*Angle of electrical axis (degrees)* — *Range of change*	*Before Diet*	*After Diet*	*Change*	*Period on rice diet (months)*
1	more than −25	+37.0	+ 2.0	−35.0	4
5	−15 to −25	+14.8	− 2.4	−17.2	5
18	− 1 to −14	+19.4	+12.8	− 6.6	5
3	± 0	−25.3	−25.3	± 0	2
22	+ 1 to +14	+19.9	+27.8	+ 7.9	6
15	+15 to +25	+ 7.4	+26.1	+18.7	5
12	more than +25	− 6.1	+30.0	+36.1	7

Of the 33 patients with definite changes in the electrical axis during the rice diet, 6 showed a decrease, 27 an increase in the angle of the electrical axis.

The T wave in lead I

In 82 patients the T_1 waves could be evaluated.

In 59 patients, there was no change in T_1 during the period of treatment with the rice diet (average four months).

In 28 of the 59 patients, T_1 was normally upright.

In 31 of them, T_1 or ST_1 was abnormal.

In 8 of the 31 patients T_1 was low upright.
In 1 diphasic.
In 20 inverted.
In 2 ST_1 was depressed, with upright T_1.

In 23 patients there was a change in T_1 during the period of treatment (average four months); in 3 the change was in the direction from upright to inverted, in 20 in the direction from inverted to upright.

In 2 patients, the upright T_1 became flat.
In 1 patient, the upright T_1 became diphasic.

In 8 patients, the flat T_1 became upright.
In 4 patients, the diphasic T_1 became upright.
In 2 patients, the inverted T_1 became diphasic.
In 6 patients, the inverted T_1 became upright.

(Fig. 7-13, 36, 41, 50)

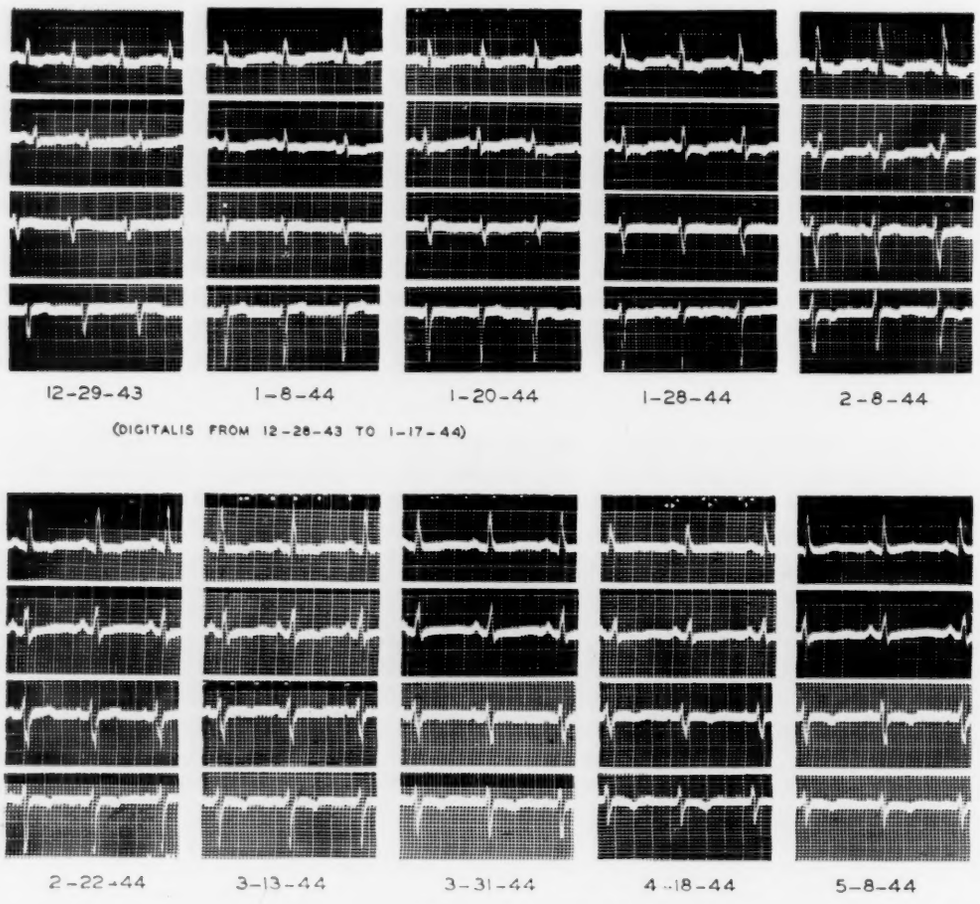


Fig. 13. L.K. (f., 33). Terminal stage of chronic nephritis. Retinopathy with papilledema, hemorrhages, exudates. Rice diet since January 7, 1944. Bedrest until March 1, 1944. No digitalis after January 17, 1944. Inverted T_1 has become upright.

Heart size

Table 5 lists the measurements of the transverse diameter of the heart in 25 patients with chronic glomerulonephritis, chronic pyelonephritis, or nephrolithiasis, 1 patient with lupus erythematosus disseminatus, and 46 patients with "hypertensive vascular disease," who received the strict or modified rice diet for periods varying from eleven days to twenty-two months.

In 6 of the 72 patients the heart became larger. In these the transverse diameter of the heart increased by 0.9 to 4.9 per cent, the average increase being 3.2 per cent. The average chest diameter increased by 1.5 per cent.

In 66 of the 72 patients the heart became smaller. In these the transverse diameter of the heart decreased by 1.8 per cent to 51.8 per cent, the average decrease being 13.3 per cent. The average chest diameter decreased by less than 0.4 per cent.

(Fig. 14-23, 33, 35, 40, 46, 49, 53, 57)

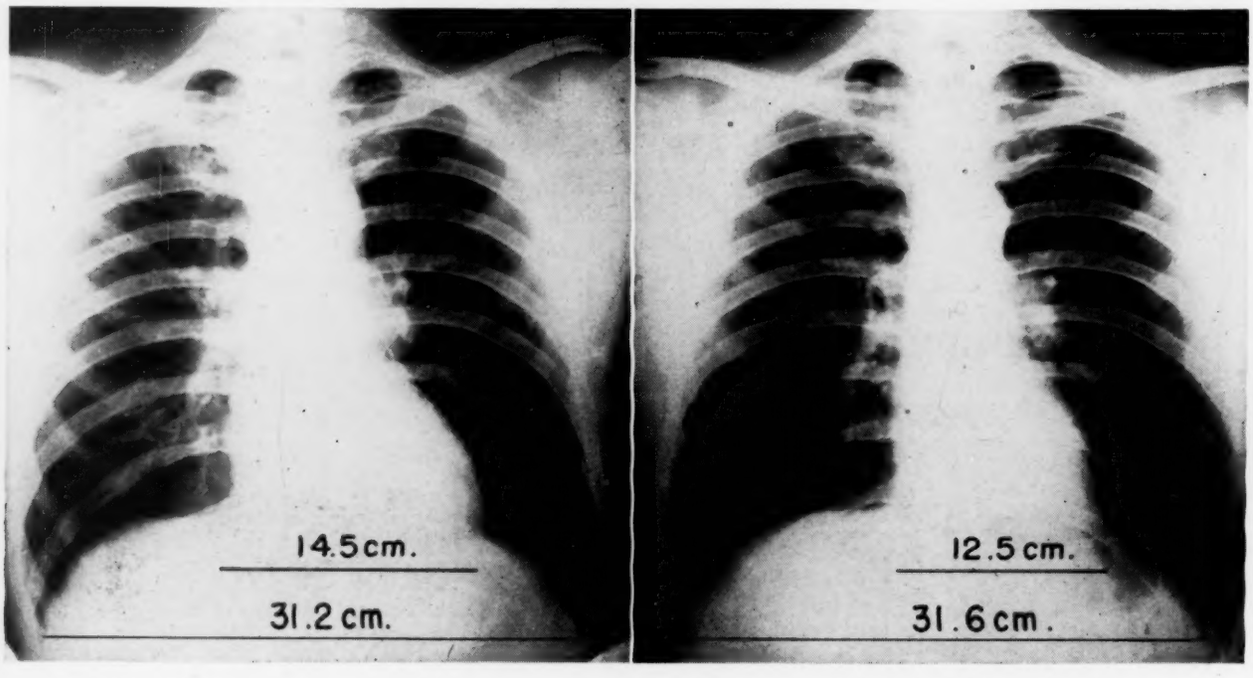
TABLE 5

EFFECT OF RICE DIET ON HEART SIZE

	Period of Rice Diet (Days)	Diameter of Chest (Cm.) Before Diet	Diameter of Chest (Cm.) After Diet	Tranverse Diameter of Heart (Cm.) Before Diet	Tranverse Diameter of Heart (Cm.) After Diet	Change in Transverse Diameter of Heart Cm.	Change in Transverse Diameter of Heart Per Cent (Transverse diameter of smaller heart = 100%)
CHRONIC GLOMERULONEPHRITIS, CHRONIC PYELONEPHRITIS, OR NEPHROLITHIASIS							
1.	312	30.1	29.8	15.9	12.35	−3.55	−28.8
2.	22	31.25	31.75	14.0	13.75	−0.25	− 1.8
3.	48	32.0	32.0	16.5	14.2	−2.3	−16.2
4.	65	25.35	25.75	10.8	9.8	−1.0	−10.2
5.	234	30.0	29.9	14.4	12.6	−1.8	−14.3
6.	19	32.4	32.7	14.2	13.8	−0.4	− 2.9
7.	28	23.2	25.4	10.6	10.9	+0.3	+ 2.8
8.	99	30.2	31.1	13.6	12.3	−1.3	−10.6
9.	50	29.3	29.3	10.35	7.9	−2.45	−31.0
10.	677	28.5	28.5	16.7	12.6	−4.1	−32.5
11.	336	27.4	28.3	11.95	10.15	−1.8	−17.7
12.	24	29.95	29.45	17.45	16.0	−1.45	− 9.1
13.	483	27.1	26.25	9.4	9.15	−0.25	− 2.7
14.	122	28.7	28.3	15.8	13.9	−1.9	−14.3
15.	119	30.8	29.9	15.8	11.8	−4.0	−33.9
16.	40	31.2	31.6	14.5	12.5	−2.0	−16.0
17.	534	30.0	27.9	16.7	11.0	−5.7	−51.8
18.	61	32.2	32.0	14.0	11.5	−2.5	−21.7
19.	58	27.65	26.9	11.4	10.85	−0.55	− 5.1
20.	67	28.6	28.0	13.05	12.0	−1.05	− 8.7
21.	95	31.2	31.2	12.9	10.3	−2.6	−25.2
22.	27	29.9	29.0	17.7	14.1	−3.6	−25.5
23.	94	28.9	28.6	12.4	11.9	−0.5	− 4.2
24.	68	28.0	28.45	11.95	11.6	−0.35	− 3.0
25.	155	31.4	31.3	12.3	12.75	+0.45	+ 3.7
Average	**153**	**29.41**	**29.33**	**13.77**	**11.99**	**−1.78**	**−15.23**
LUPUS ERYTHEMATOSUS DISSEMINATUS							
1.	165	26.8	25.5	12.8	9.9	−2.9	−29.3
"HYPERTENSIVE VASCULAR DISEASE"							
1.	67	33.8	33.8	15.0	12.8	−2.2	−17.2
2.	100	31.2	30.6	13.4	12.2	−1.2	− 9.8
3.	20	31.3	29.8	13.5	11.75	−1.75	−14.9
4.	66	28.2	27.55	15.9	14.4	−1.5	−10.4
5.	43	30.9	29.95	16.2	14.6	−1.6	−10.9
6.	71	31.9	31.9	16.4	14.0	−2.4	−17.1
7.	64	28.6	28.4	14.3	15.0	+0.7	+ 4.9
8.	215	24.7	24.45	12.25	11.15	−1.1	− 9.9
9.	174	31.8	31.4	16.7	15.5	−1.2	− 7.7
10.	32	29.1	29.3	19.1	17.8	−1.3	− 7.3
11.	588	30.0	29.2	11.9	10.9	−1.0	− 9.2
12.	50	28.4	29.9	16.3	15.3	−1.0	− 6.5
13.	32	29.8	29.3	15.4	14.2	−1.2	− 8.0
14.	62	28.3	30.3	18.0	13.4	−4.6	−34.3
15.	55	33.85	33.3	14.0	13.25	−0.75	− 5.7
16.	178	30.5	30.1	14.85	14.1	−0.75	− 5.3
17.	117	31.25	30.6	18.0	14.6	−3.4	−23.3

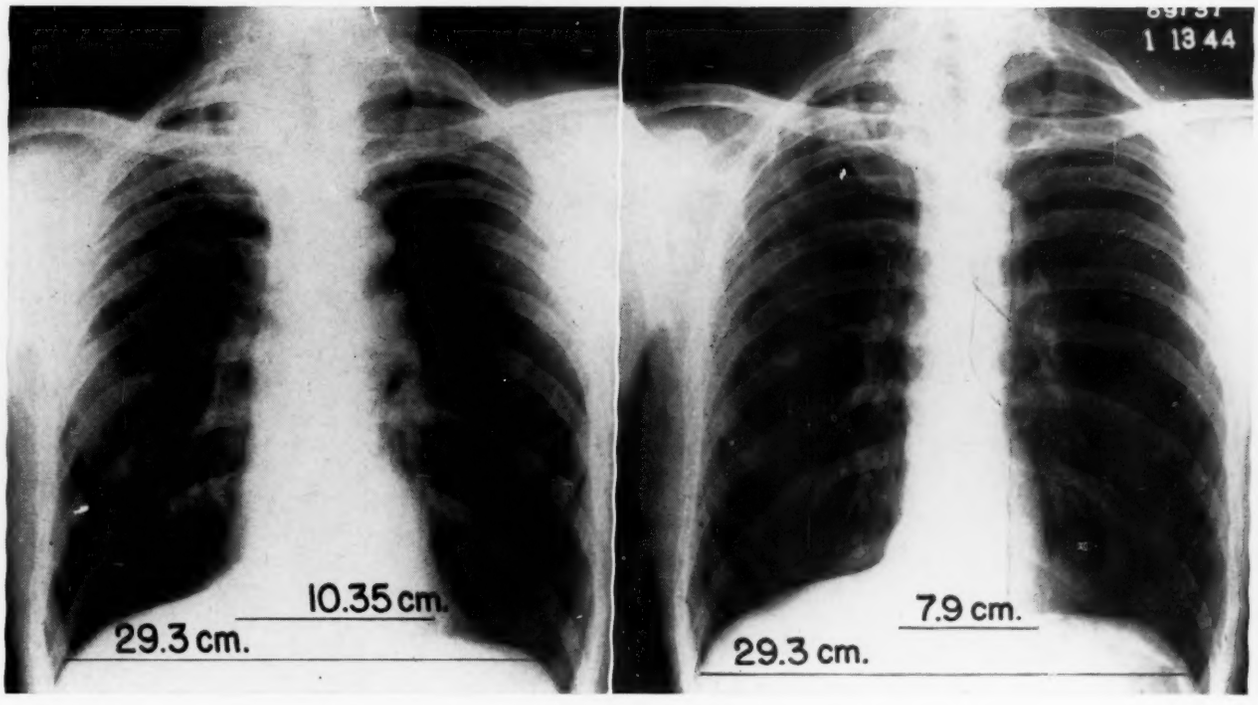
TABLE 5—Continued

	Period of Rice Diet (Days)	Diameter of Chest (Cm.) Before Diet	Diameter of Chest (Cm.) After Diet	Transverse Diameter of Heart (Cm.) Before Diet	Transverse Diameter of Heart (Cm.) After Diet	Change in Transverse Diameter of Heart Cm.	Change in Transverse Diameter of Heart Per Cent (Transverse diameter of smaller heart = 100%)
18.	37	31.8	32.0	16.8	15.7	−1.1	− 7.0
19.	54	24.05	24.25	14.0	12.65	−1.35	−10.7
20.	25	26.55	26.8	17.15	15.2	−1.95	−12.8
21.	129	32.3	31.8	15.4	14.1	−1.3	− 9.2
22.	125	31.7	31.8	15.3	13.4	−1.9	−14.2
23.	43	32.4	32.8	16.5	13.8	−2.7	−19.6
24.	253	28.4	27.5	10.75	10.5	−0.25	− 2.4
25.	32	23.95	24.75	13.85	13.5	−0.35	− 2.6
26.	86	26.0	25.6	13.8	12.6	−1.2	− 9.5
27.	173	26.5	26.25	13.9	12.8	−1.1	− 8.6
28.	32	31.1	31.9	15.6	14.4	−1.2	− 8.3
29.	116	24.85	25.45	10.6	10.7	+0.1	+ 0.9
30.	55	30.2	30.4	14.2	12.4	−1.8	−14.4
31.	18	32.2	32.6	16.2	15.5	−0.7	− 4.5
32.	34	24.75	24.5	12.25	11.75	−0.5	− 4.3
33.	24	32.7	32.4	14.6	13.25	−1.35	−10.2
34.	30	30.7	30.2	15.7	14.6	−1.1	− 7.5
35.	53	26.1	25.95	11.55	10.35	−1.2	−11.6
36.	36	25.1	24.8	12.5	11.2	−1.3	−11.6
37.	43	26.8	26.2	13.8	14.4	+0.6	+ 4.3
38.	28	27.0	27.3	11.7	12.0	+0.3	+ 2.6
39.	115	29.8	30.25	14.9	13.25	−1.65	−12.5
40.	20	26.4	25.15	12.7	11.3	−1.4	−12.4
41.	412	29.0	29.1	14.0	13.2	−0.8	− 6.1
42.	40	26.9	27.0	15.9	14.0	−1.9	−13.6
43.	98	22.05	22.05	12.10	10.75	−1.35	−12.6
44.	22	34.65	33.7	17.6	16.35	−1.25	− 7.6
45.	21	28.4	31.45	15.65	14.1	−1.55	−11.0
46.	174	29.7	31.1	14.7	12.7	−2.0	−15.8
Average	**93**	**29.04**	**29.02**	**14.67**	**13.38**	**−1.29**	**− 9.68**



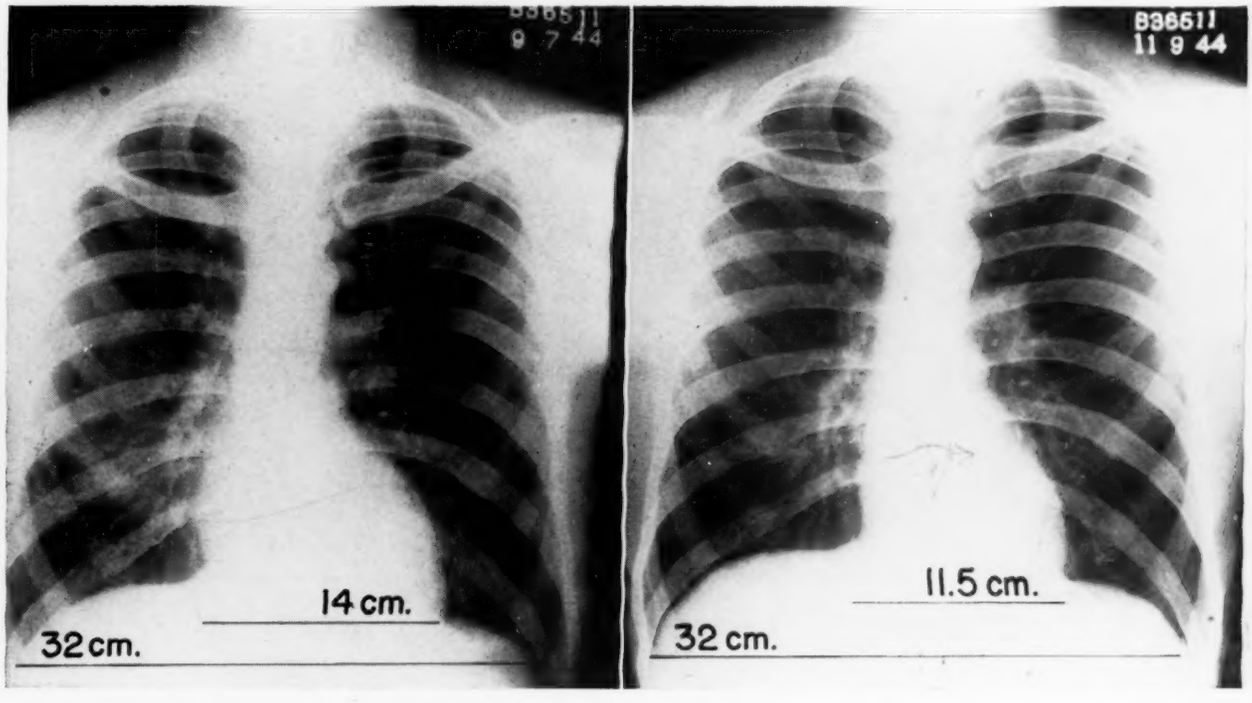
7-12-43 197/139 mm. Hg. 8-21-43 134/104 mm. Hg.

Fig. 14. W.McL. (m., 35). Chronic glomerulonephritis. Retinopathy with hemorrhages and exudates. Phenolsulfonphthalein excretion in two hours, 31 per cent. Rice diet since July 12, 1943. Bedrest. No digitalis. Reduction in heart size with change in transverse diameter of 16 per cent.



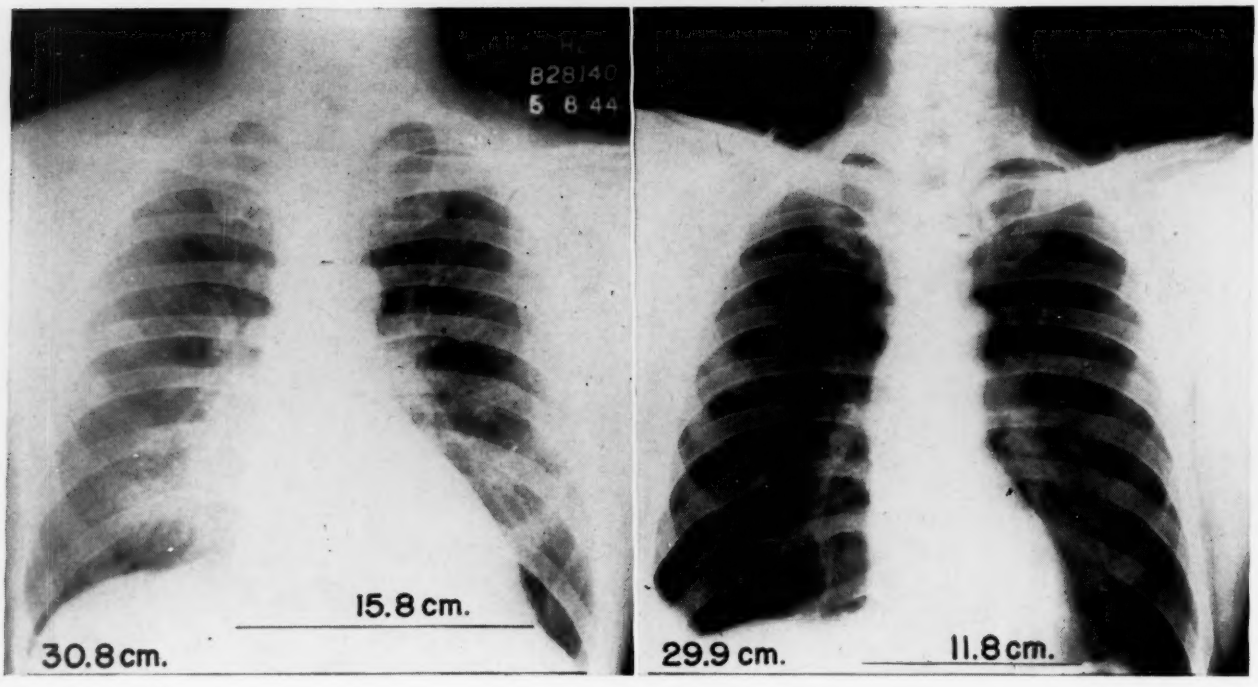
11-16-43 220/130 mm. Hg. 1-13-44 111/79 mm. Hg.

Fig. 15. A.G. (m., 53). Chronic glomerulonephritis. Phenolsulfonphthalein excretion in two hours, 50 per cent. Rice diet since November 24, 1943. Bedrest part of the time. No digitalis. Reduction in heart size with change in transverse diameter of 31 per cent.



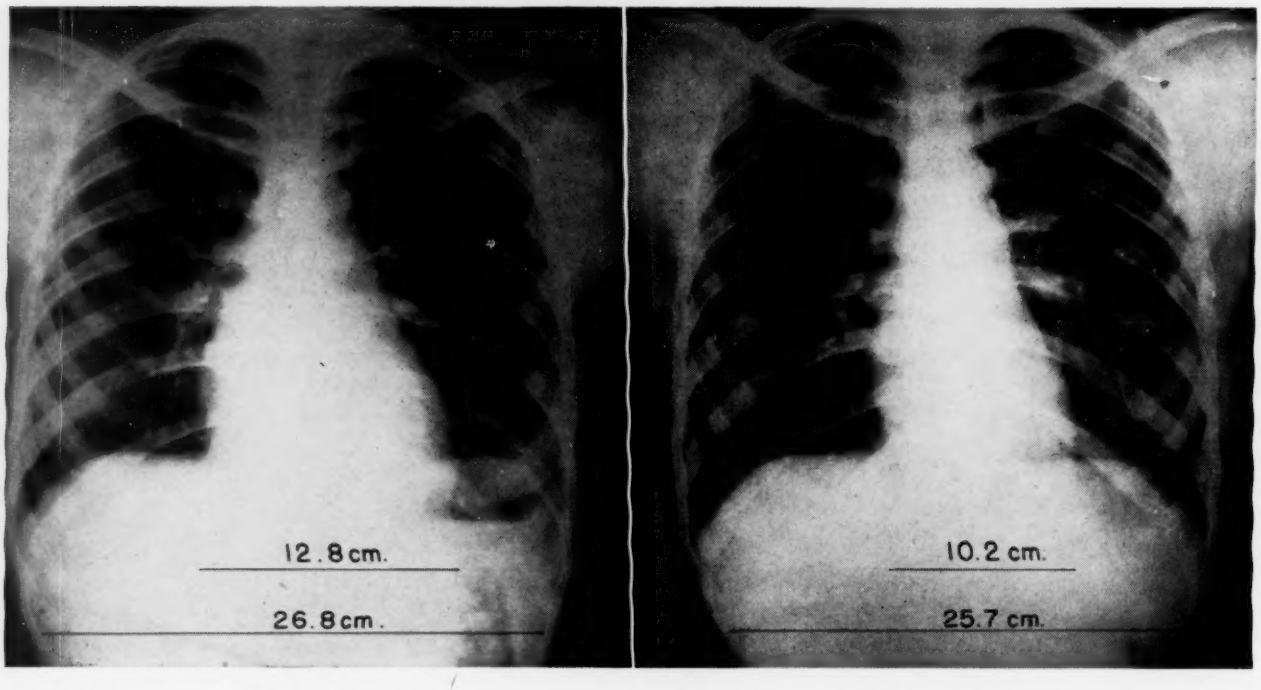
9-7-44 140/96 mm. Hg. 11-9-44 146/80 mm. Hg.

Fig. 16. B.M. (m., 31). Chronic nephritis. Phenolsulfonphthalein excretion in two hours, 7 per cent. Rice diet since September 9, 1944. No bedrest. No digitalis. Reduction in heart size with change in transverse diameter of 21 per cent.



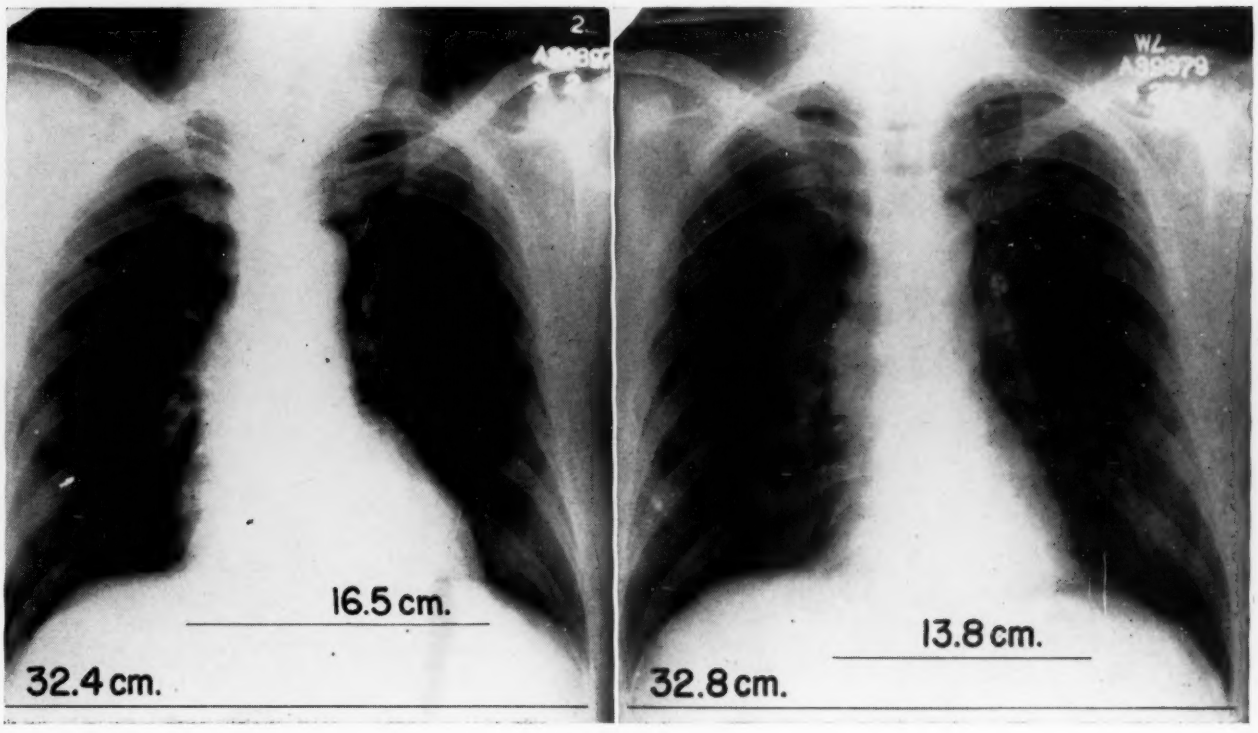
5-6-44 144/84 mm. Hg. 9-9-44 130/80 mm. Hg.

Fig. 17. B.K. (m., 43). Terminal stage of chronic nephritis. Phenolsulfonphthalein excretion in two hours, 0.56 per cent. Rice diet since May 13, 1944. No digitalis. Bedrest part of the time. Reduction in heart size with change in transverse diameter of 34 per cent.



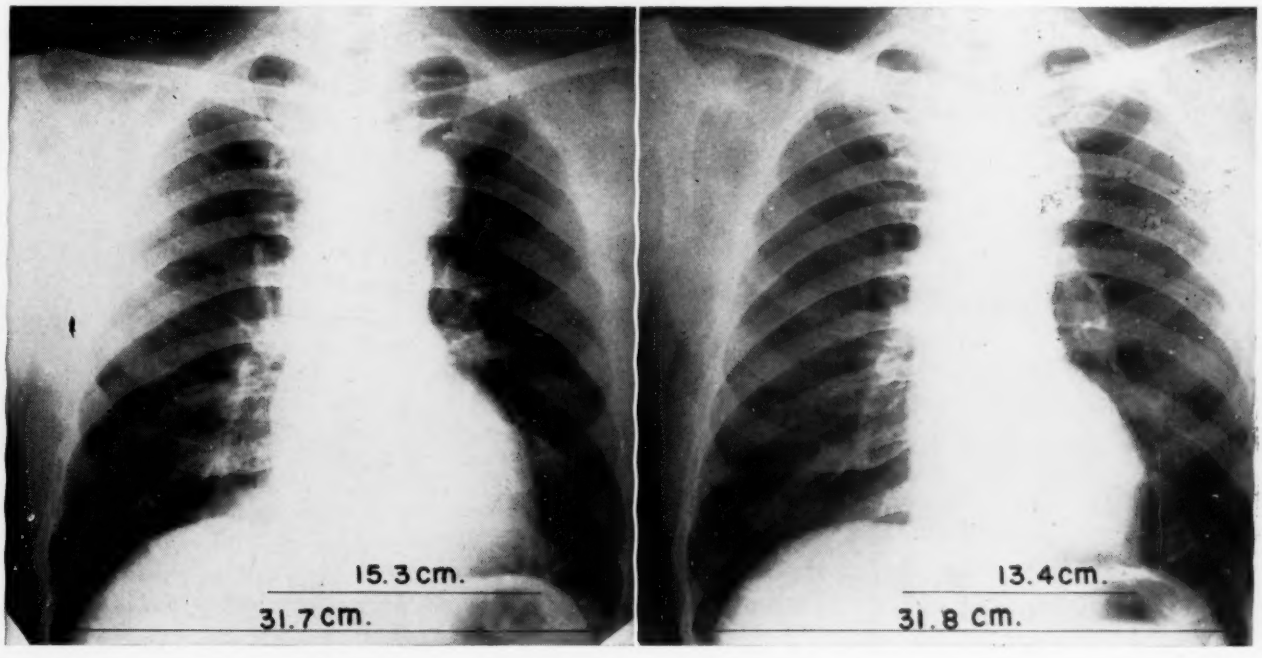
6-28-43 110/60 mm. Hg. 9-3-43 94/60 mm. Hg.

Fig. 18. T.A. (f., 20). Lupus erythematosus disseminatus. Exudative retinopathy. Phenolsulfonphthalein excretion in two hours, 75 per cent. Rice diet since July 19, 1943. Bedrest. No digitalis. Reduction in heart size with change in transverse diameter of 25 per cent.



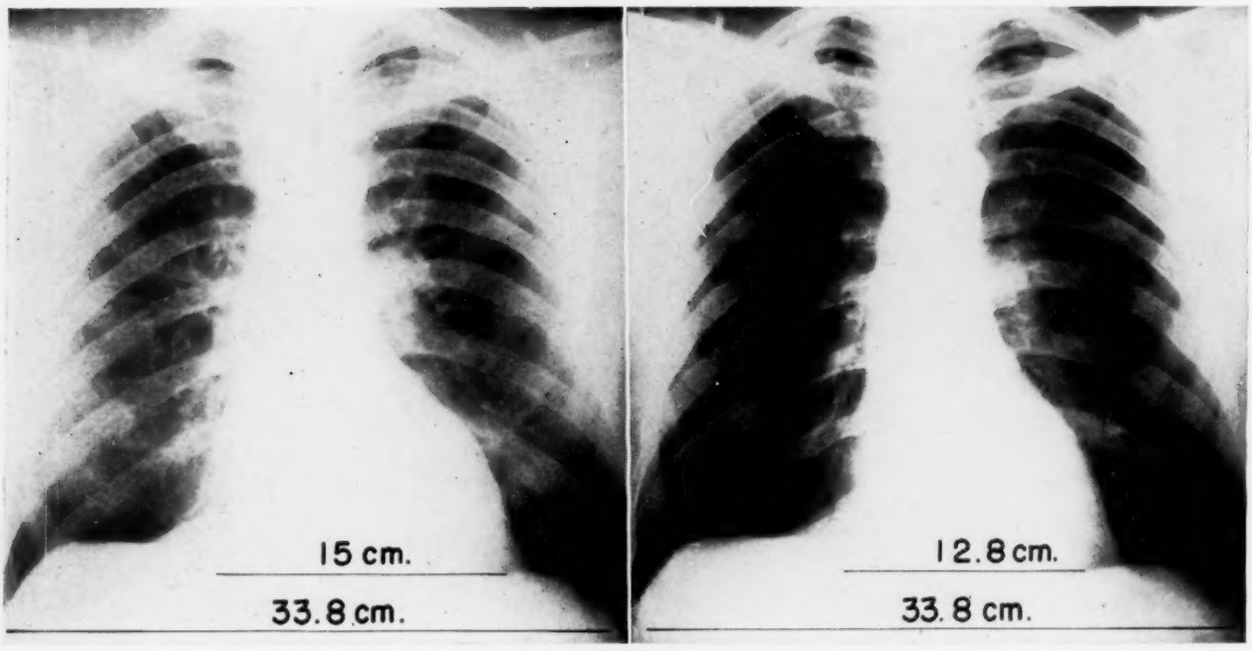
3-2-44 220/124 mm. Hg. 4-27-44 140/97 mm. Hg.

Fig. 19. J.K. (m., 48). "Hypertensive vascular disease." Phenolsulfonphthalein excretion in two hours, 63 per cent. Rice diet since March 14, 1944. No digitalis. No bedrest. Reduction in heart size with change in transverse diameter of 20 per cent.



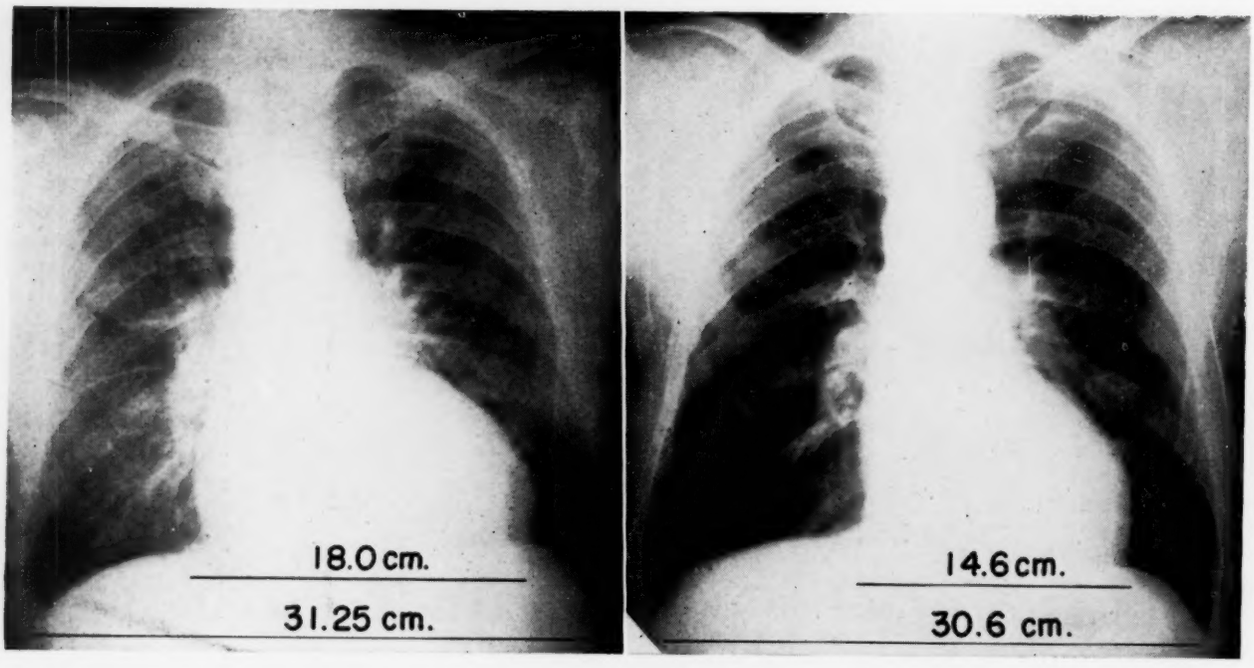
9-28-43 220/150 mm. Hg. 2-1-44 152/110 mm. Hg.

Fig. 20. J.L. (m., 54). "Hypertensive vascular disease." Phenolsulfonphthalein excretion in two hours, 50 per cent. Rice diet since October 3, 1943. No digitalis. No bedrest (three months of bedrest before admission because of coronary infarction). Reduction in heart size with change in transverse diameter of 14 per cent.



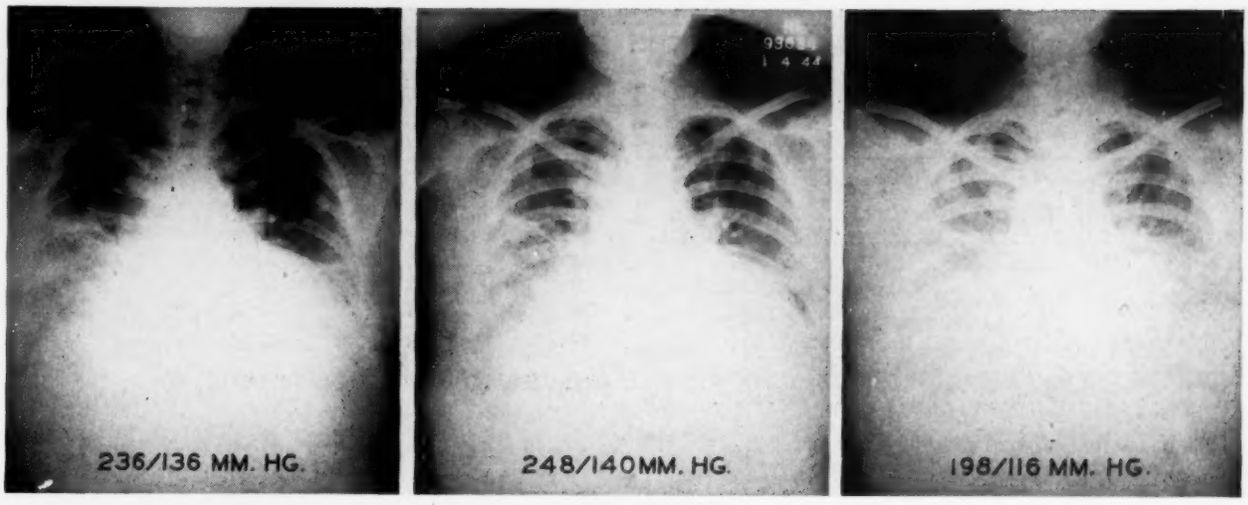
9-13-43 208/118 mm. Hg. 11-22-43 148/100 mm. Hg.

Fig. 21. J.L.A. (m., 46). "Hypertensive vascular disease." Retinopathy with papilledema. Phenolsulfonphthalein excretion in two hours, 54 per cent. Rice diet since September 16, 1943. Bedrest. No digitalis. Reduction in heart size with change in transverse diameter of 17 per cent.



3-24-43 212/110 mm. Hg. 7-28-43 137/63 mm. Hg.

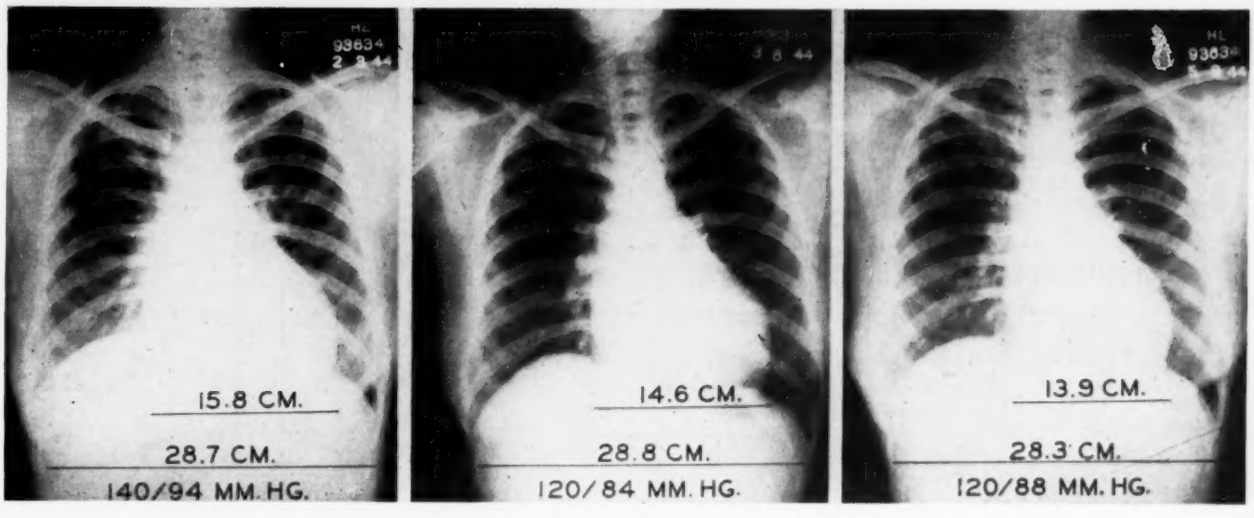
Fig. 22. J.F. (m., 65). "Hypertensive vascular disease." Phenolsulfonphthalein excretion in two hours, 43 per cent. Rice diet since April 2, 1943. No bedrest. No digitalis. Reduction in heart size with change in transverse diameter of 23 per cent.



12-30-43

1-4-44
(Venous pressure (1-8-44): 215 mm. saline)

1-17-44
(Venous pressure (1-20-44): 141 mm. saline)



2-3-44
(Venous pressure (2-2-44): 80 mm. saline)

3-6-44

5-8-44

Fig. 23. L.K. (f., 33). Terminal stage of chronic nephritis, with pericarditis and retinopathy with papilledema, hemorrhages, exudates. Phenolsulfonphthalein excretion in two hours, 1.4 per cent. Rice diet since January 7, 1944. Bedrest until March 1, 1944. No digitalis after January 17, 1944. After the pericarditis cleared up, the heart size was reduced, with a change in the transverse diameter of 14 per cent.

Nonprotein Nitrogen

Table 6 shows the effect of the rice diet on the nonprotein nitrogen of 171 patients who received the strict or modified diet for periods varying from four days to thirty-two months. Five patients had acute glomerulonephritis, 66 patients chronic glomerulonephritis, chronic pyelonephritis, nephrolithiasis, or polycystic kidney disease, 2 patients lupus erythematosus, 55 patients "hypertensive vascular disease" with "secondary" renal involvement, 43 patients "hypertensive vascular disease" without conclusive evidence of renal excretory dysfunction.

Twenty-two patients died after six to eighty-one days (average twenty-five); 1 patient died after thirty months:

Average nonprotein nitrogen:
Before diet .....115 mg. per 100 cc. of blood
Before death .....186 mg. per 100 cc. of blood

The nonprotein nitrogen of 35 patients increased or did not decrease during the period of rice diet:

Average nonprotein nitrogen:
Before diet .....42.7 mg. per 100 cc. of blood
After 63 days of diet 50.2 mg. per 100 cc. of blood

The nonprotein nitrogen of 113 patients decreased during the period of diet:

Average nonprotein nitrogen:
Before diet .....53.1 mg. per 100 cc. of blood
After 78 days of diet 36.0 mg. per 100 cc. of blood

TABLE 6

EFFECT OF RICE DIET ON NONPROTEIN NITROGEN

	Phenolsulfonphthalein Test (Total Excretion in 2 Hours) Per Cent	*Nonprotein Nitrogen (mg. per 100 cc. blood)*			*Days on Rice Diet*
		Before Rice Diet	*After Rice Diet*	*Change*	
ACUTE GLOMERULONEPHRITIS					
1.	75, 60	73	31	−42	153
2.	55, 61	37	28	− 9	11
3.	78	54	26	−28	32
4.	78, 85, 71	33	27	− 6	180
5.	40, 50	32	28	− 4	83
Average		**46**	**28**	**−18**	**92**
CHRONIC GLOMERULONEPHRITIS, CHRONIC PYELONEPHRITIS, NEPHROLITHIASIS, OR POLYCYSTIC KIDNEY DISEASE					
NPN Increased or Unchanged					
Initial NPN 39-238 mg. per 100 cc. blood					
1.*	30	174	360	+186	37
2.*	2	90	138	+ 48	9
3.*		132	375	+243	38
4.*	less than 9	78	203	+125	50
5.	2, 1.2	138	170	+ 32	36
6.	3, 7, 14.5, 12, 10, 9, 1	77	78	+ 1	710
7.*	less than 3	190	355	+165	16
8.	5, 10	132	150	+ 18	27
9.*	19, 33, 24	42	145	+103	595
10.*	less than 5	190	208	+ 18	30
11.*	20	87	143	+ 56	10
12.*	0	238	300	+ 62	32
13.	51, 51	43	46	+ 3	210
14.	54, 57.5	39	46	+ 7	8
Average		**118**	**194**	**+ 76**	**129**
Initial NPN 22-35 mg. per 100 cc. blood					
15.*	45	28	76	+ 48	35
16.	80	22	32	+ 10	20
17.	62.5	30	32	+ 2	19
18.	55, 50	33	42	+ 9	14
19.	45, 39, 38	35	35	0	21
20.*	55, 43,	35	204	+169	42
Average		**30**	**70**	**+ 40**	**25**
NPN Decreased					
Initial NPN 39-242 mg. per 100 cc. blood					
1.	17.5	87	38	− 49	90
2.	50, 33	43	31	− 12	62
3.	77	41	28	− 13	70
4.	15	118	108	− 10	16
5.	20, 12	60	44	− 16	65
6.	30, 22	42	29	− 13	30
7.	22.5, 27.5, 30, 22.5, 25	72	33	− 39	160
8.	4.5, 4, 4.3, 5	143	46	− 97	252
9.	20, 22.5, 35, 21, 25, 22. 23	58	32	− 26	406
10.	12.5, less than 22.5, 25, 9, 18, 19	46	32	− 14	198
11.	less than 2, 1.4, 3.2, 3.3, less than 1	68	47	− 21	137
12.	Faint trace	156	84	− 72	27
13.		175	102	− 73	29
14.	40, 38, 17.5, 27.5	85	80	− 5	45
15.	25, 27.5, 16, 15, 18.5, 23, 21	54	36	− 18	236
16.	8	78	63	− 15	7
17.	5, 10, 7, 10	73	41	− 32	240
18.*	0, less than 1, less than 1	138	104	− 34	42
19.	25, 20, 18, 30, 25, 12, 16	66	62	− 4	348
20.	47, 55, 40	55	31	− 24	72
21.	40, 40	53	48	− 5	67
22.	70	175	35	−140	38
23.	22	44	27	− 17	80
24.	55	46	26	− 20	14
25.	0.1	168	102	− 66	42
26.	65	48	27	− 21	17

* Death after 6-595 days.

TABLE 6—Continued

	Phenolsulfonphthalein Test (Total Excretion in 2 Hours) Per Cent	*Nonprotein Nitrogen (mg. per 100 cc. blood)*			
		Before Rice Diet	*After Rice Diet*	*Change*	*Days on Rice Diet*
27.	less than 1, less than 1, less than 1, 0	125	84	− 41	119
28.	5.5, 2.2	82	60	− 22	21
29.	70	39	32	− 7	6
30.	4, 7, 10.5	87	46	− 41	59
31.		93	71	− 22	31
32.	3	71	46	− 25	7
33.	71, 68	42	34	− 8	58
34.	10.2, 4.7	140	87	− 53	49
35.	less than 1	242	84	−158	51
Average		**89**	**54**	**− 35**	**91.5**
Initial NPN 27-38 mg. per 100 cc. blood					
36.	70	27	23	− 4	7
37.	72	31	29	− 2	24
38.	65	33	31	− 2	28
39.	64	30	25	− 5	15
40.	55	34	30	− 4	22
41.	38, 19, 24	36	34	− 2	190
42.	49, 52	32	27	− 5	19
43.		31	24	− 7	25
44.	67	29	25	− 4	98
45.	45	38	28	− 10	16
46.	75, 69, 77	33	28	− 5	215
Average		**32**	**28**	**− 4**	**60**
LUPUS ERYTHEMATOSUS					
1.	65, 85	55	45	− 10	91
2.	65, 57	69	34	− 35	27
Average		**62**	**39.5**	**− 22.5**	**59**
"HYPERTENSIVE VASCULAR DISEASE" WITH "SECONDARY" RENAL INVOLVEMENT					
NPN Unchanged or Increased					
Initial NPN 42-277 mg. per 100 cc. blood					
1.*	0	230	260	+ 30	22
2.	2.3	67	108	+ 41	8
3.*	18	80	111	+ 31	81
4.*	15.5	61	108	+ 47	27
5.*		202	252	+ 50	10
6.	5	51	75	+ 24	18
7.*	11, 7	54	102	+ 48	15
8.*		110	198	+ 88	14
9.	25	42	46	+ 4	25
10.	30	42	44	+ 2	32
11.		78	109	+ 31	22
12.*	60	48	74	+ 26	6
13.*		66	104	+ 38	17
14.*		277	292	+ 15	7
15.*	28, 32	57	126	+ 69	7
16.	45	48	54	+ 6	48
Average		**95**	**129**	**+ 34**	**22.5**
Initial NPN 27-37 mg. per 100 cc. blood					
17.	70, 45, 48	35	35	0	66
18.*		36	45	+ 9	10
19.	47, 65	29	49	+ 20	78
20.	20	34	37	+ 3	29
21.	42, 43, 51	33	33	0	86
22.	70, 85	27	40	+ 13	30
23.	46	37	40	+ 3	15
Average		**33**	**40**	**+ 7**	**45**
NPN Decreased					
Initial NPN 39-63 mg. per 100 cc. blood					
1.	75	57	41	− 16	68
2.	45, 42.5	40	21	− 19	9
3.	67, 75, 48, 51	44	24	− 20	209
4.	47, 69.5	40	25	− 15	32
5.	40	40	30	− 10	82

* Death after 6-595 days.

TABLE 6—Continued

	Phenolsulfonphthalein Test (Total Excretion in 2 Hours) Per Cent	Nonprotein Nitrogen (mg. per 100 cc. blood) Before Rice Diet	After Rice Diet	Change	Days on Rice Diet
6.	49	58	38	− 20	10
7.	44	42	32	− 10	35
8.	40, 45	49	44	− 5	103
9.	44, 48, 54	39	24	− 15	121
10.	50	50	37	− 13	28
11.	45	52	38	− 14	32
12.	64	51	32	− 19	7
13.	28	50	33	− 17	32
14.		57	34	− 23	9
15.	45	58	44	− 14	13
16.		48	41	− 7	7
17.	45	53	24	− 29	6
18.	55, 50	46	31	− 15	79
19.	45, 68	47	34	− 13	77
20.		63	44	− 19	40
21.	50, 65	40	37	− 3	22
Average		**49**	**34**	**− 15**	**49**
Initial NPN 28-38 mg. per 100 cc. blood					
22.	57	33	28	− 5	47
23.	57, 28, 30	36	34	− 2	15
24.	58, 54, 65, 53	29	18	− 11	970
25.	32	35	32	− 3	60
26.	60, 60, 55	29	26	− 3	90
27.	47	38	33	− 5	20
28.	32, 52, 67	35	23	− 12	113
29.	37, 64	33	24	− 9	198
30.	30	36	28	− 8	15
31.	66, 64, 47, 58	33	25	− 8	177
32.	59, 44	28	25	− 3	127
Average		**33**	**27**	**− 6**	**167**
"HYPERTENSIVE VASCULAR DISEASE" WITHOUT CONCLUSIVE EVIDENCE OF RENAL INVOLVEMENT					
NPN Unchanged or Increased					
Initial NPN 23-40 mg. per 100 cc. blood					
1.	65	35	40	+ 5	13
2.	83, 60	26	28	+ 2	61
3.	53	33	34	+ 1	26
4.		26	28	+ 2	11
5.	69	35	35	0	13
6.	55, 49	34	36	+ 2	132
7.	69, 87, 91	27	28	+ 1	252
8.	61	23	25	+ 2	14
9.	63	32	38	+ 6	12
10.		31	36	+ 5	7
11.	52	28	28	0	36
12.	64	26	32	+ 6	4
13.	55	40	41	+ 1	4
14.	57	28	28	0	86
Average		**30**	**32.5**	**+ 2.5**	**48**
NPN Decreased					
Initial NPN 25-40 mg. per 100 cc. blood					
1.	74, 71, 72	33	27	− 6	239
2.	97	34	32	− 2	16
3.		37	26	− 11	48
4.	67, 75	34	25	− 9	72
5.	59	31	24	− 7	57
6.	92	30	28	− 2	60
7.	59	34	29	− 5	112
8.	52	37	33	− 4	32
9.	65	25	23	− 2	21
10.	62, 69	29	21	− 8	55
11.	53	27	20	− 7	38
12.	70	30	28	− 2	22
13.	55, 55	30	29	− 1	65
14.	58	40	30	− 10	82
15.	69	26	25	− 1	28

TABLE 6—Continued

	Phenolsulfonphthalein Test (Total Excretion in 2 Hours) Per Cent	Nonprotein Nitrogen (mg. per 100 cc. blood) Before Rice Diet	After Rice Diet	Change	Days on Rice Diet
16.	67	28	24	— 4	18
17.	82, 90, 71	30	26	— 4	22
18.	64, 86	30	24	— 6	113
19.	72	31	26	— 5	20
20.	53	31	29	— 2	18
21.	55	35	27	— 8	45
22.	72, 63	36	32	— 4	26
23.	73	35	25	— 10	149
24.	88	30	24	— 6	34
25.	70	39	27	— 12	4
26.	78	28	22	— 6	17
27.	63, 87	29	24	— 5	96
28.	81	30	25	— 5	23
29.	69	39	30	— 9	18
Average		**32**	**26**	**— 6**	**53**

An erroneous impression might be conveyed by the figures in table 6, because only the nonprotein nitrogen values before the start of treatment and the last ones recorded after treatment are compared. Since many patients with chronic kidney disease, however, do not realize the seriousness of their condition before manifestations of terminal renal failure become apparent, they frequently come to the hospital at a time when the nonprotein nitrogen is no longer at a constant level, but is rising rapidly. The effect of the diet in such instances might therefore be seen more correctly in the difference between the patient's nonprotein nitrogen at the end of the treatment and his highest nonprotein nitrogen value, even if this value was found after he was already on the diet (fig. 24).

The lowering of the nonprotein nitrogen in the greater number of patients is not the only point of significance in table 6; the length of time on the rice diet is also important, for it shows that in spite of even critical decrease in renal excretory function, as indicated by the low phenolsulfonphthalein excretion, the usually progressive increase of the nonprotein nitrogen and actual uremia may be prevented for years.

Histories 1-3, 5-7 and figures 24, 34, 38, 45, 47 illustrate the response of the nonprotein nitrogen to the diet.

Urea

Table 7 shows the effect of the strict or modified rice diet on the blood urea nitrogen concentration and on the urea nitrogen-nonprotein nitrogen ratio in 63 patients.

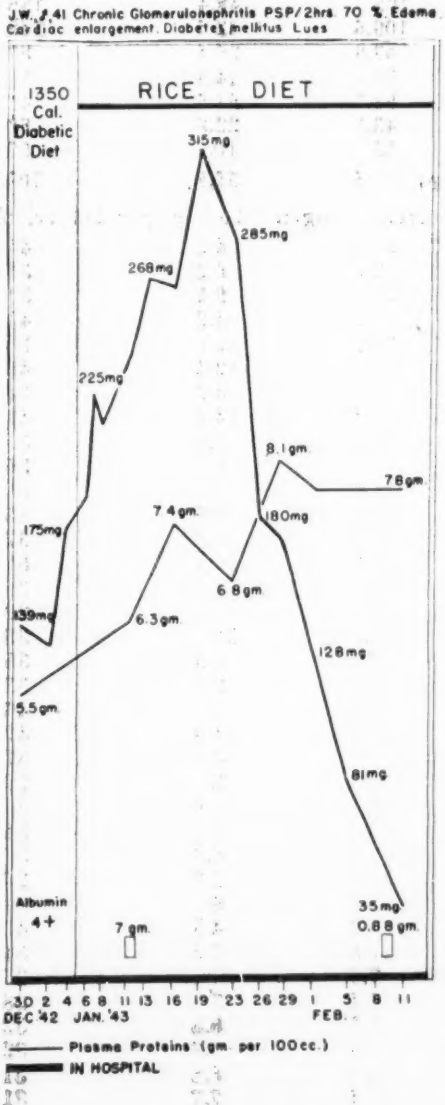


Fig. 24. J.W. (m., 41). Blood nonprotein nitrogen (mg. per 100 cc.) of nephritic patient with rapidly developing uremia.

TABLE 7

EFFECT OF RICE DIET ON BLOOD UREA NITROGEN

	UREA NITROGEN (mg. per 100 cc. blood)		*NONPROTEIN NITROGEN (mg. per 100 cc. blood)*		*UREA RATIO %*		
	Before Rice Diet	*After Rice Diet*	*Before Rice Diet*	*After Rice Diet*	*Before Rice Diet*	*After Rice Diet*	*Days on Rice Diet*
I. Urea Nitrogen Increased							
Initial urea nitrogen 32-116 mg. per 100 cc. blood							
1.	116	130.8	138	163	84.1	80.2	28
2.	47.4	56.8	90	93	52.7	61.1	53
3.	32.7	77.4	61	108	53.6	71.7	27
4.	50	51.8	70	114	71	45.4	15
5.	89.1	181.7	110	198	81	91.8	14
Average	**67**	**99.7**	**94**	**135**	**68.5**	**70**	**27**
Initial urea nitrogen 10 mg. per 100 cc. blood							
6.	10.1	14.9	30	40	34	37.2	14
II. Urea Nitrogen Decreased							
Initial urea nitrogen 33-110 mg. per 100 cc. blood							
1.	36.8	27.3	60	44	61.3	62.5	62
2.	108	70.3	168	102	64.3	68.9	47
3.	42.3	24.2	68	47	62.2	51.5	166
4.	105	48.4	156	84	67.3	57.6	27
5.	109.6	42.4	148	84	74.1	50.5	118
6.	49.9	26.4	87	48	57.4	55	42
7.	34	14.9	50	31	68	48.1	92
8.	91.5	61.6	140	87	65	70.8	48
9.	43.5	22.8	80	48	54.4	47.5	42
10.	33	10.7	50	33	66	32.4	32
Average	**65.4**	**34.9**	**100.7**	**60.8**	**64**	**54.5**	**68**
Initial urea nitrogen 7-29 mg. per 100 cc. blood							
11.	20.4	4.2	44	31	46.4	13.5	131
12.	12.6	6.2	31	29	40.6	22.8	23
13.	21	9.1	36	34	58.3	27	190
14.	15.2	4.2	41	26	37.1	16.2	190
15.	28.9	12.6	55	31	52.5	40.6	70
16.	25.7	12.4	42	34	61.2	36.5	57
17.	10.8	4.2	34	28	31.8	15	210
18.	21.4	14.4	42	30	51	48	189
19.	21.2	7.8	35	35	60.6	22.3	36
20.	18.4	9	36	36	51.1	25	146
21.	15.6	7.8	33	25	47.3	31.2	32
22.	18.1	3.6	36	18	50.3	20	970
23.	19.2	12.7	37	38	51.9	33.4	46
24.	24.2	14.4	51	32	47.5	45	224
25.	18	4.3	39	24	46.2	17.9	153
26.	8.9	7.8	29	26	30.7	30	79
27.	17.2	10	38	33	45.3	30.3	20
28.	10.8	8.3	35	24	30.9	34.6	200
29.	10.2	2.3	33	18	30.9	12.8	460
30.	16.5	6	46	31	36	19.7	77
31.	20	14.9	47	35	42.6	42.6	240
32.	14	4.2	37	21	37.8	20	20
33.	9.9	5	29	25	34.1	20	72
34.	11.3	6.6	30	25	37.7	26.4	125
35.	15.8	6.1	34	29	46.5	21	112
36.	13.8	6.6	36	21	38.3	31.4	55
37.	10.2	1.8	26	25	39.2	7.2	191
38.	11.9	6	27	20	44.1	30	38
39.	14.2	4.5	40	30	35.5	15	82
40.	11.8	7.2	34	36	34.7	20	129
41.	7.7	1.8	26	29	29.6	6.2	172
42.	10.4	3.6	28	24	37.1	15	81
43.	8.1	5.5	32	30	25.3	18	68
44.	11.9	7.8	32	38	37.2	20.5	11
45.	10.9	6.6	31	30	35.2	22	120
46.	11.4	7.7	31	29	36.8	26.6	18
47.	12.6	6.6	35	27	36.1	24.4	45
48.	14	5.4	28	28	50	19.3	36
49.	13.8	2.4	36	32	38.3	7.5	26
50.	10.8	5.4	30	25	36	21.6	10

TABLE 7—Continued

	UREA NITROGEN (mg. per 100 cc. blood)		NONPROTEIN NITROGEN (mg. per 100 cc. blood)		UREA RATIO %		
	Before Rice Diet	After Rice Diet	Before Rice Diet	After Rice Diet	Before Rice Diet	After Rice Diet	Days on Rice Diet
51.	9.5	4.8	28	30	33.9	16	85
52.	9.1	4.2	30	25	30	16.8	23
53.	12.6	7.8	28	24	44.1	32.5	26
54.	16.8	4.2	36	30	46.7	14	35
55.	12.6	2.4	33	26	38.2	9.2	251
56.	13.7	9	36	34	38.1	26.5	23
57.	7.1	1.2	28	25	25.4	4.8	127
Average	**14.5**	**6.6**	**35**	**28**	**40.8**	**22.9**	**122**

In 6 of the 63 patients the blood urea nitrogen increased (group I). Two of these died after fourteen and twenty-seven days.

	Urea N (average) (mg. per 100 cc. of blood)	Urea N-NPN ratio (average) (per cent)
Initial urea nitrogen 32-116 mg. per 100 cc. of blood (I, patients 1-5)		
Before diet	67	68.5
After 27 days of diet	99.7	70.0
Initial urea nitrogen 10 mg. per 100 cc. of blood (I, patient 6)		
Before diet	10.1	34
After 14 days of diet	14.9	37.2

In 57 of the 63 patients the blood urea nitrogen decreased (group II).

	Urea N (average) (mg. per 100 cc. of blood)	Urea N-NPN ratio (average) (per cent)
Initial urea nitrogen 33-110 mg. per 100 cc. of blood (II, patients 1-10)		
Before diet	65.4	64
After 68 days of diet	34.9	54.5
Initial urea nitrogen 7-29 mg. per 100 cc. of blood (II, patients 11-57)		
Before diet	14.5	40.8
After 122 days of diet	6.6	22.9

Of 48 patients whose initial urea nitrogen concentration was normal or almost normal (7-29 mg. per 100 cc. of blood), only 1 patient had an increase of the blood urea nitrogen concentration, whereas 47 patients had an average decrease of the blood urea nitrogen concentration of 55 per cent.

The lowest urea nitrogen values we found were 1.2 mg. per 100 cc. of blood in 1 patient, and 1.8-2.4 mg. per 100 cc. of blood in 4 patients. The urea nitrogen-nonprotein nitrogen ratio in these 5 patients ranged from 4.8 to 12.4 per cent[6].

This finding again shows that patients on the rice diet are in protein equilibrium, since in fasting and inanition the urea nitrogen concentration of the blood is increased.

6. Dr. Haywood Taylor of the Department of Biochemistry is engaged in a study to determine the nature of those nonprotein nitrogen substances, the increase of which makes up for the decreased urea ratio in the blood of patients on the rice diet.

Two hundred and eighty-one determinations of the urea nitrogen excretion per twenty-four hours in the urine of 96 patients with kidney disease (with a nonprotein nitrogen not above 50 mg. per 100 cc. of blood), or with "hypertensive vascular disease," before and after they had received the rice diet for varying periods of time, are summarized in table 8.

TABLE 8

Urea Excretion in Urine

Period on rice diet	Number of patients	Number of determinations	Gm. urea nitrogen excreted in 24 hours (average)
0*	49	60	5.4
1-14 days	46	73	2.9
15-30 days	36	47	1.9
1-2 months	22	35	1.6
Over 2 months	30	66	1.1

* In many instances the protein intake before the beginning of the rice diet had been limited, either because the patients were too ill to eat the full amount of a mixed diet, or because they had received other low protein diets. The regular hospital diet contains about 65 Gm. of protein.

The twenty-four hour urinary urea nitrogen excretion on a 100 Gm. protein diet is about 12 Gm., in complete starvation about 6 Gm., after an average period of two or more months on the rice diet about 1.1 Gm.

The excretion of urea constitutes one of the main tasks of the kidney. According to Addis[7], the excretion of 10 Gm. of urea nitrogen requires 677 gram calories of work from the kidney. Borsook[8] has calculated that ordinarily 76 per cent of all the work of the kidney is spent on urea excretion. The fact that the rice diet causes an 80 or 90 per cent reduction in urinary urea excretion may not be without effect upon the "metabolic situation" of the kidney cells.

This article will be concluded in the March issue of the JOURNAL.

7. Addis, T.: Theory and Practice in Dietetic Treatment of Glomerular Nephritis, J. Am. Dietet. A. 16:306-312 (April) 1940.

8. Borsook, H., and Winegarden, H. M.: The Work of the Kidney in the Production of Urine, Proc. Nat. Acad. Sc. 17:3-13, 1931.

THE TREATMENT OF FRACTURES OF THE HUMERUS WITH THE HANGING CAST

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For about two years we have treated almost all fractures of the humerus above the supracondylar level with the hanging cast and shoulder exercises. The results have been highly satisfactory in most cases, but we have also had several poor results. The hanging cast treatment, when used in properly selected cases, is most economical for patient and surgeon; it is therefore important to recognize what types of fractures are satisfactorily treated by the hanging cast and in what types other methods of treatment are preferable. It was with the hope of answering this question that a review of our cases was undertaken.

The principle of the hanging cast is not new. Many older textbooks of surgery illustrate the treatment of a fractured humerus by the traction of a weight suspended from the flexed elbow and by the support of some type of coaptation splinting about the arm. The application of the ordinary arm cast for this purpose, however, is fairly recent. It was first used extensively by Dr. John Caldwell of Cincinnati, who reported his experience with it in 1933[1]. Since that time a great many favorable reports on the use of the hanging cast have been published, and a number of minor modifications of the treatment have been suggested. Some observers have restricted the use of the hanging cast to fractures of the humeral shaft proper, while others have described favorable results from its use in fractures of the surgical neck.

Technique

As ordinarily used, the hanging cast is applied without anesthesia and with or without gentle manipulation to help align the fragments. It extends high on the arm; it supports the wrist but restricts the thumb and fingers very little (fig. 1). It should be quite thin, and may be unpadded or lightly padded. Two loops of traction rope incorporated in the final turns of plaster provide attachment for a muslin neck-wrist sling if

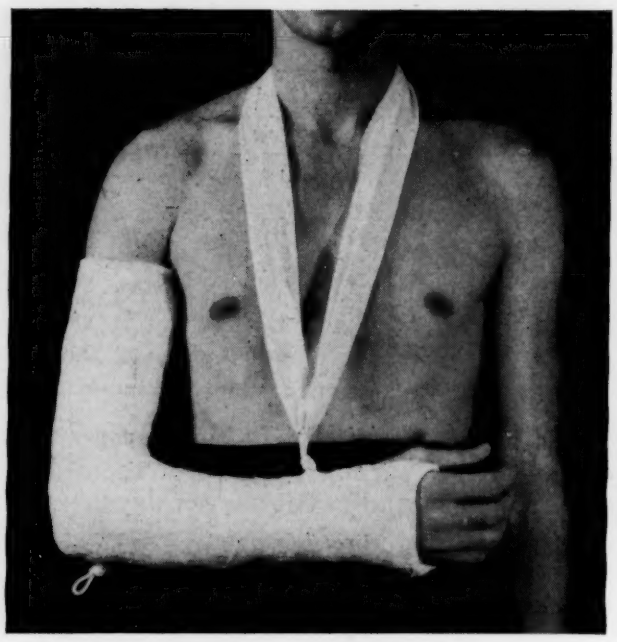

Fig. 1. The hanging cast as ordinarily applied. It is quite thin and light. The elbow loop is used when the patient must be recumbent because of additional injuries.

the patient is ambulatory, or direct traction to the foot of the bed if the patient must be recumbent because of other injuries (fig. 2). The necessity of allowing the pull to act continuously is explained to the patient, and his cooperation is secured. The ambulatory patient is asked to sleep in a sitting or a Fowler's position during the first week or ten days. The amount of traction on his arm may be adjusted by placing the wrist loop in a somewhat more proximal or more distal position.

Careful x-ray follow-up is essential. Usually the first check-up films, taken with the patient standing, are made a week after the cast is applied; this period of time is allowed for gravity, acting through soft tissue attachments, to effect reduction. If modification of the cast is necessary to improve the

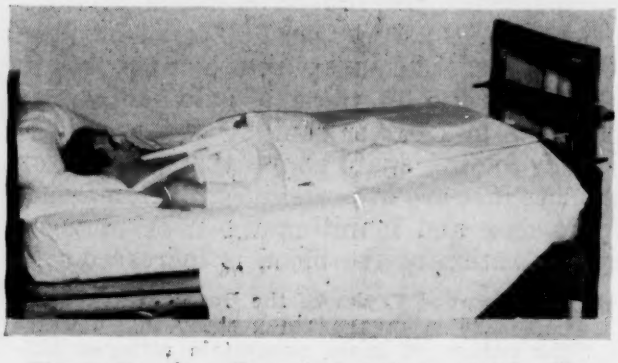

Fig. 2. The recumbent patient is treated by the traction of a weight hanging at the foot of the bed and acting through the elbow loop.

From the Orthopedic Division of the Department of Surgery, Duke University School of Medicine, Durham, N. C. Read before the Section on Surgery, Medical Society of the State of North Carolina, Pinehurst, May 3, 1944.

1. Caldwell, J. A.: Treatment of Fractures in the Cincinnati General Hospital, Ann. Surg. 97:161-176 (Feb.) 1933.

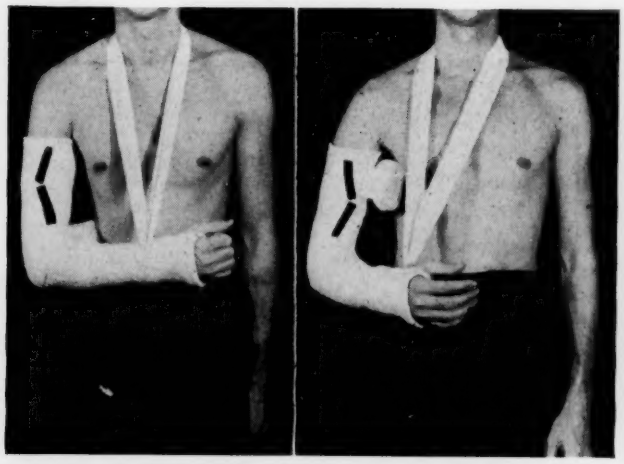

Fig. 3. Elbow pad and dorsal wrist loop tend to correct anterolateral angulation. Axillary pad and volar wrist loop tend to correct posteromedial angulation.

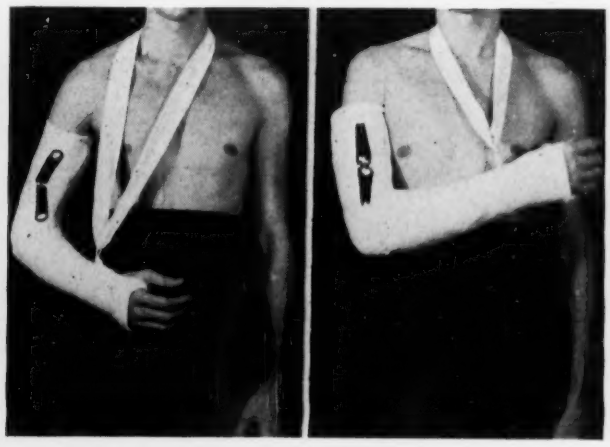

Fig. 4. A long sling tends to correst posterior angulation; a short sling tends to correct anterior angulation.

alignment of the fragments, frequent x-ray re-examinations are imperative. This is particularly true in the second to the fourth week, when the fragments are beginning to unite.

The relative positions of the fragments in the hanging cast may be altered in several ways. In the cast the humerus lies in partial internal rotation. Its anterior surface is therefore directed anteromedially. Anterolateral angulation may be counteracted by placing an abduction pad of felt between elbow and chest; posteromedial angulation may be counteracted by a pad between upper arm and chest. Placing the wrist loop dorsally helps correct lateral angulation; placing it on the volar aspect counteracts medial angulation (fig. 3). Another method of exerting corrective force after application of the cast is changing the length of the sling (fig. 4). A long sling tends to correct posterior angulation; a short sling acts to decrease anterior angulation. Such modifications are indicated when slowly progressive improvement in the position of displaced fragments fails to take place. Repeated alterations of the cast, however, are undesirable and in most cases are unnecessary.

Active exercises form an essential part of the hanging cast treatment (fig. 5). The patient is urged to carry these out twice daily, beginning in a gentle fashion immediately after application of the cast, and continuing more vigorously until full function of the extremity is restored. The shoulder exercises are of two types, circumduction and rotation, and are carried out with the patient standing and leaning forward. In doing the

Fig. 5. Shoulder exercises: Circumduction about the shoulder, and rotation about the longitudinal axis of the humerus.

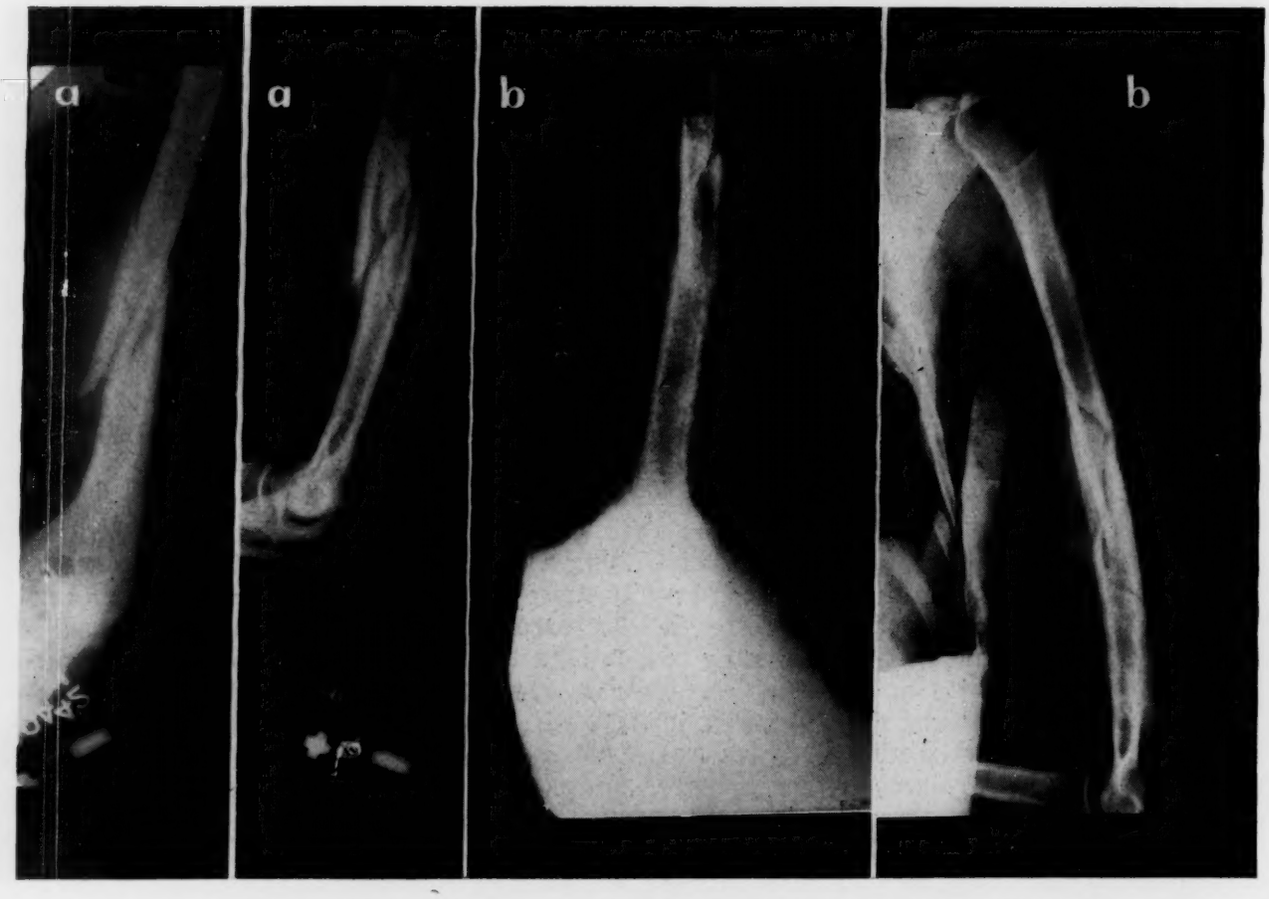

Fig. 6. (A) Comminuted oblique fracture of the middle third of the shaft. (B) After several weeks in the cast, the alignment is improved and union has begun.

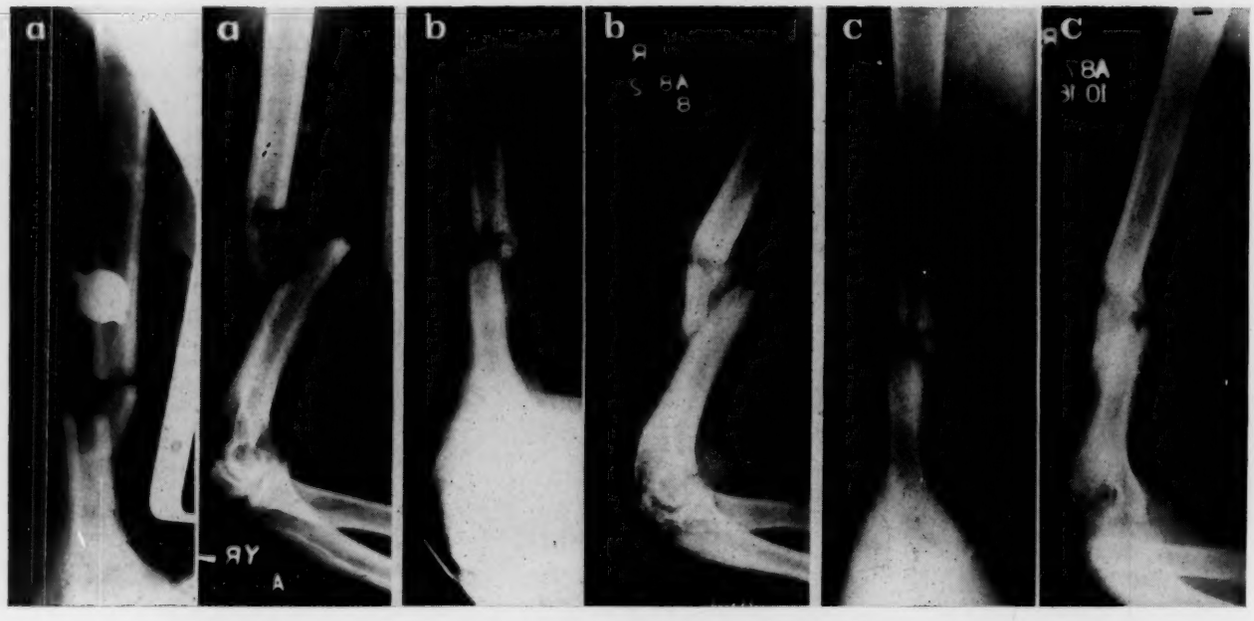

Fig. 7. Comminuted fracture of the shaft with distraction of the major fragments. X-rays made (A) on the day of injury, (B) seven weeks after injury, and (C) on removal of the cast thirteen weeks after injury.

circumduction exercise, the patient swings the entire extremity around in as large a circle as he can make. In doing the rotation exercise, he turns the extremity about the longitudinal axis of the humerus through as great an angle as possible. After removal of the cast—at a period varying widely from about two to about twelve weeks after its application — exercise of the shoulder in other positions is added, as are exercises of the elbow and wrist.

Results

In our total of 30 cases treated by the hanging cast, only 20 patients had sufficient follow-up to warrant analysis of the end result. Many of our patients live at a considerable distance from Durham and find transportation difficult. In evaluating the end results we considered the most important criteria to be union, the final joint mobility, and, least important, the final x-ray alignment. We had no case of delayed union or of non-union.

Eight fractures of the shaft of the humerus were treated by this method (figs. 6 and 7), and an excellent clinical and x-ray result was obtained in 3 cases. An entirely satisfactory clinical result with imperfect x-ray alignment was secured in 4 cases. In

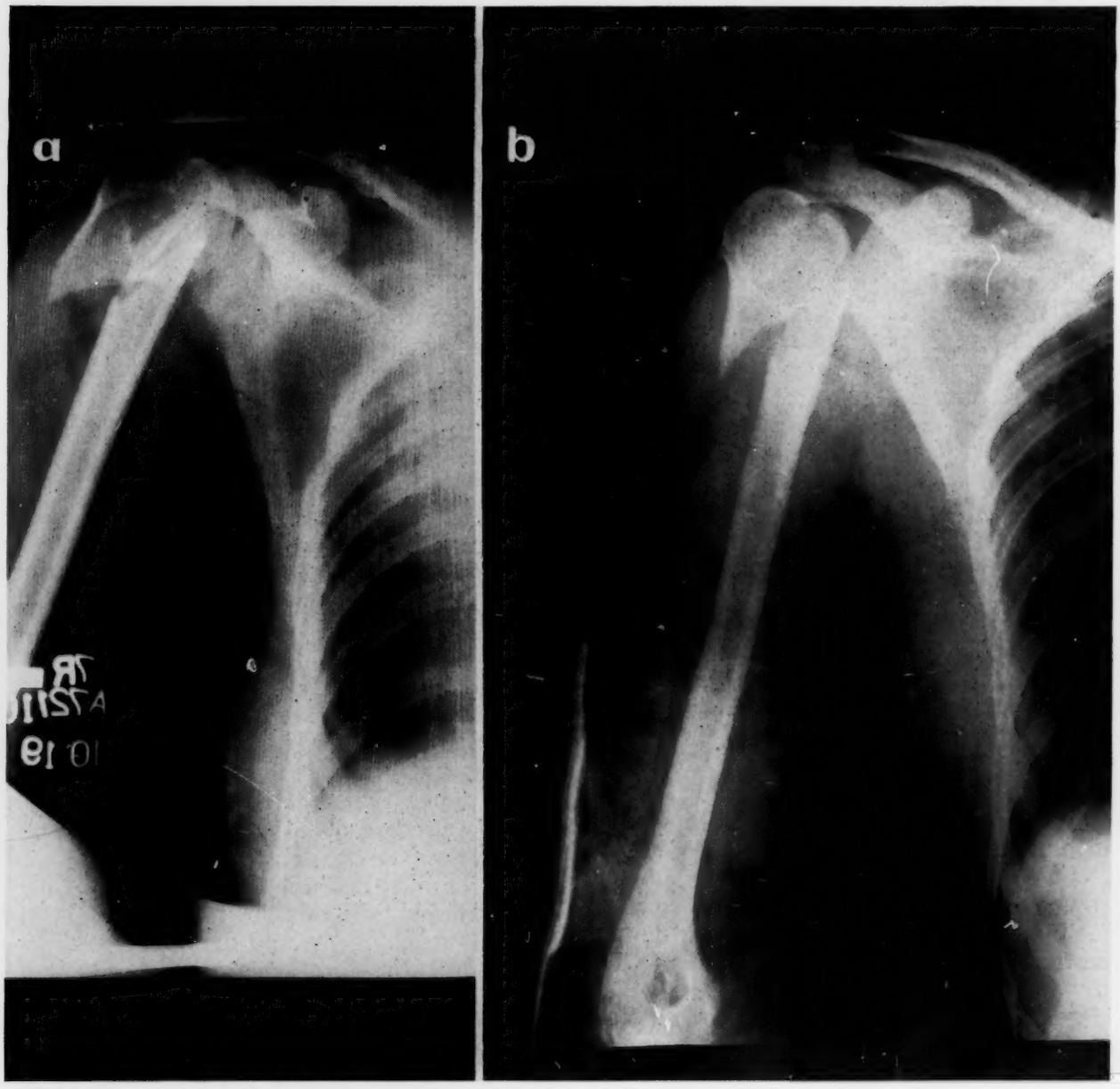

Fig. 8. (A) Displaced fracture of the surgical neck. (B) Three weeks after injury and application of cast, the displacement has not been corrected. The clinical result in this case was entirely satisfactory.

the remaining case the result was satisfactory in all respects except that slight impairment of mobility of the shoulder persisted. This patient was a colored woman of 40 years who sustained multiple rib fractures and a compound fracture of the tibia and fibula in addition to the fractured humerus. She was confined to bed for seven weeks by complications of the chest injury.

In 12 fractures of the surgical neck of the humerus treated only by the hanging cast and shoulder exercises, an excellent clinical and x-ray result was obtained in 4 cases, an entirely satisfactory clinical result with imperfect x-ray alignment in 5 cases (fig. 8), and a poor result in 3 cases. These last 3 patients had severe comminuted fractures which were not reduced by the hanging cast; they developed subluxation of the head of the humerus, necessitating change to a different type of treatment.

Conclusions

We have concluded that application of the hanging cast, followed immediately by active exercise of the shoulder, is an excellent treatment for fractures of the shaft of the humerus regardless of obliquity, comminution, and displacement. A possible exception to this is the uncommon transverse fracture accompanied by distraction of the fragments in the longitudinal axis of the humerus. We have had little experience in treating compound fractures by this method but feel that the hanging cast would provide good treatment following debridement of the wound. We have also found that the hanging cast makes a satisfactory support after internal fixation of fractures of the humeral shaft.

In fractures of the surgical neck, the hanging cast is an excellent method of treatment if the fracture is incomplete, undisplaced, or impacted in good alignment. When the displacement is slight or when a perfect anatomical result is not important, the hanging cast treatment is satisfactory. In our hands the hanging cast alone has not provided uniformly good results in displaced fractures of the surgical neck. We do not feel that it can be relied upon to effect reduction in these cases; when reduction is considered necessary, it should be secured by other means before a hanging cast is applied. We feel, however, that in these fractures impaired mobility of the shoulder is due more often to changes in the soft tissues than to bony displacement, and that the hanging cast treatment will often minimize shoulder stiffness. Demonstrable weakness of the soft tissues at the shoulder, post-traumatic or otherwise, contraindicates use of the hanging cast because of the danger of subluxation of the shoulder joint.

Appreciation is expressed to Dr. Lenox D. Baker for assistance in the clinical work on which this paper is based.

A SIMPLE METHOD OF FRACTURE FIXATION WITH THE KIRSCHNER WIRE

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The manifold apparatuses used for fracture fixation are sufficient evidence that no universally satisfactory procedure has yet been evolved. In the reduction and fixation of any fracture, the simplest method that yields good results is always to be preferred.

A fracture that can be reduced and firmly held by the closed method should certainly be treated by that method. A fracture that cannot be satisfactorily reduced by the closed method should have some form of internal fixation applied. There are many types of fractures that always require operation and internal fixation, and in these cases it is folly to waste time in attempting closed reductions.

There is an increasing trend toward open reduction of fractures. Impetus has been given to this by the introduction of the so-called non-irritating metals for internal fixation.

The methods and materials available for internal fixation are varied. The use of Steinmann pins passed through the bone above and below the fracture has been popular in recent years. The fracture is reduced in an apparatus such as that designed by Roger Anderson and the pins are incorporated in the plaster cast.

This method has the advantage of obviating an incision directly down to the fracture, but it is cumbersome and difficult to use. A preferable procedure, where closed reduction cannot be accomplished, is to expose the fracture site, remove any soft tissue that may be between the broken ends of the bone, very accurately replace the fragments, and apply directly some form of fixation such as

Read before the Section on Surgery, Medical Society of the State of North Carolina, May 3, 1944.

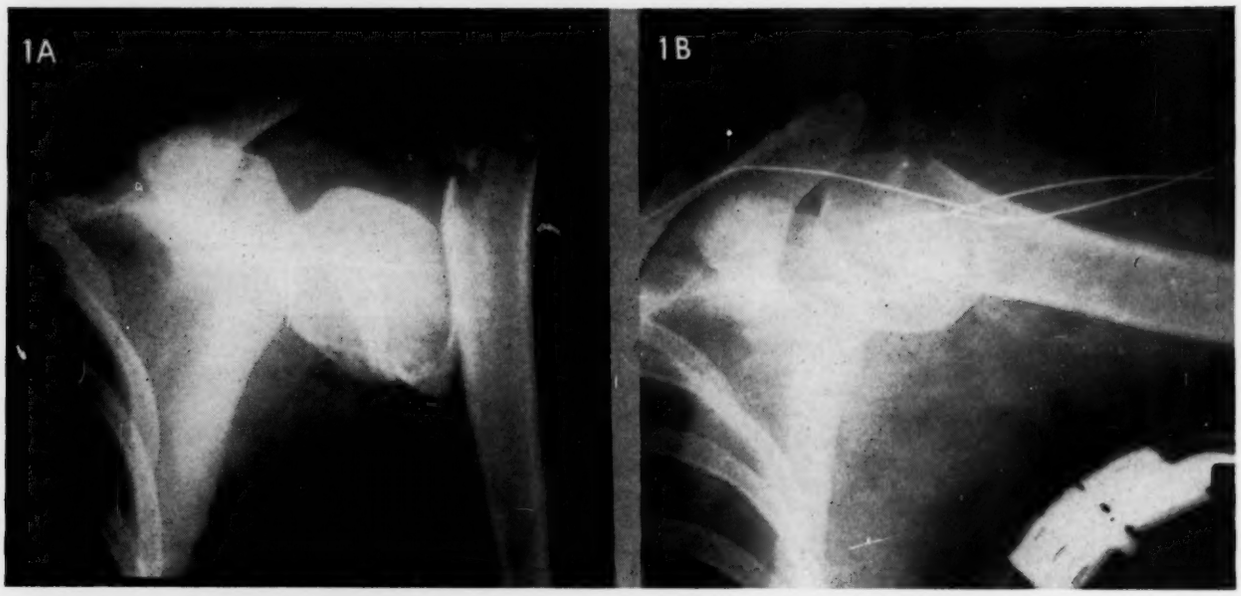

Fig. 1. (A) Fracture-dislocation of the shoulder. (B) Open reduction of the dislocation and fracture, and fixation by three Kirschner wires passed obliquely through the fracture line.

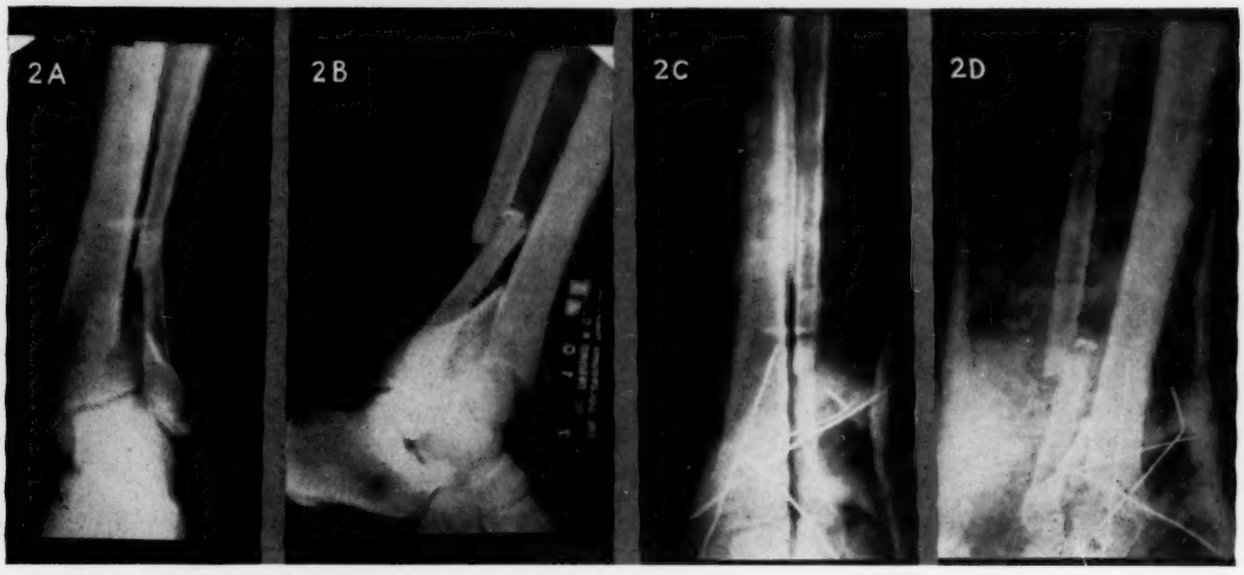

Fig. 2. (A and B) Comminuted fracture about the ankle joint. (C and D) Satisfactory reduction and fixation with four wires.

a nail, a screw, a metal plate, a Parham band, a bone graft, a wire suture, or very occasionally a chromic gut or kangaroo tendon suture. As Dr. Paul Magnuson[1] said, "One point to be kept in mind constantly is that every fracture differs from every other fracture that one has ever seen." The material used for fixation must depend upon the judgment of the surgeon. It should not be irritating to the bone or the surrounding tissue; its application should entail as little disturbance to the periosteum as possible; it should be as small as is compatible with firm fixation, so that a minimum amount of foreign material is left in the wound; and its removal should be simple.

In a number of cases requiring open reduction we have fixed the fracture satisfactorily by passing one or more Kirschner wires diagonally from one fragment into the other, obliquely traversing the fracture line. This method utilizes the crossed-nail locking principle well known to carpenters, holds the fracture firmly in place, results in a minimum of disturbance to the periosteum, and leaves but a small amount of foreign material in the wound. The distal end of the wire should penetrate the cortex of the second fragment of bone. There is no need

1. Magnuson, Paul B.: Simplicity in Fracture Treatment, Bull. Am. Coll. Surgeons 28:135-137 (June) 1943.

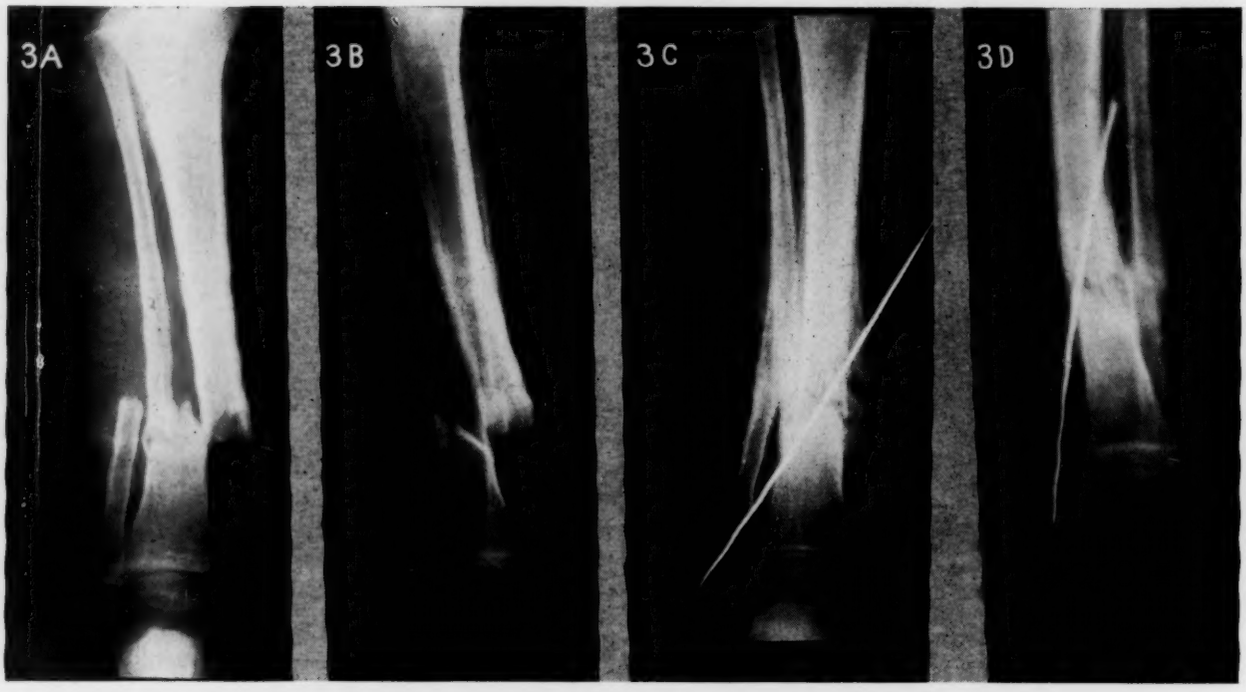

Fig. 3. (A and B) Compound fracture of the tibia and tibula with much destruction of the soft tissues. (C and D) Fixation with one Kirschner wire; a window is left in the cast for subsequent dressings.

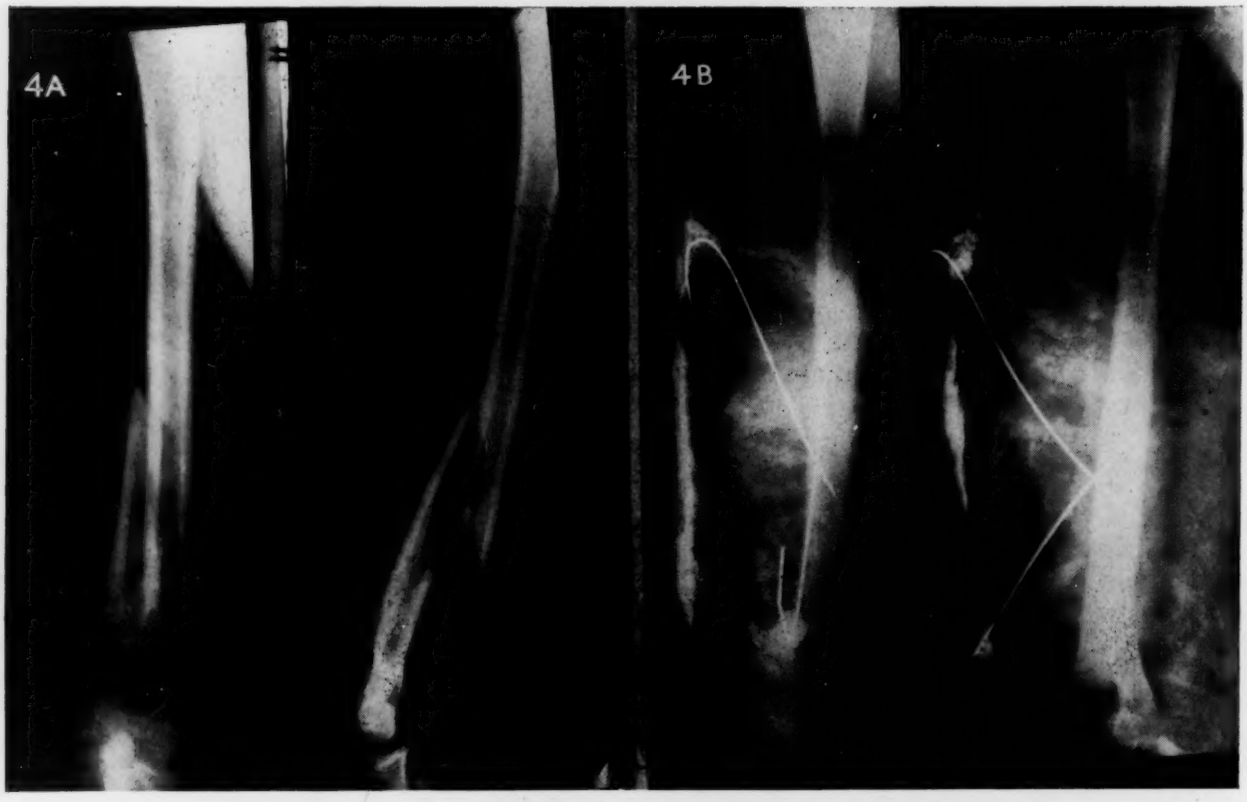

Fig. 4. (A) Spiral oblique fracture of the humerus. (B) Open reduction performed because of symptoms of impingement on the musculo-spiral nerve. Fixation by two Kirschner wires; hanging cast applied.

Fig. 5. (A) Comminuted fracture of the lower end of the femur. (B) Open reduction and fixation of all fragments with five Kirschner wires.

to pass the tip out into the soft tissues for any distance, and it should not be allowed to penetrate the skin on the opposite side of the extremity. The proximal end of the wire should extend to the outer part of the supporting cast; it is bent and incorporated in the last plaster roll. This procedure firmly fixes it and prevents its extrusion, its further entrance into the tissue, and its possible migration to distant parts.

After union has become firm, the wires are readily removed by simply nicking the plaster and pulling them out. This is done without discomfort to the patient and without disturbing or weakening the cast. Thus early removal of all foreign material is possible, and the supporting cast is left undisturbed until firm bony union has been accomplished. A second incision for the removal of the fixation apparatus is not necessary. Since the distal end of the wire has not passed through the skin on the opposite side, there is no danger of dragging infection into the tissue as the wire is removed.

Fracture fixation by the simple use of the Kirschner wire is not new. It has been employed in the reduction of factures of practically all bones of the extremities and in fractures of the clavicle[2]. More recently a case was reported in which it was used to reduce a fractured sternum[3]. Unfortunate results have occurred when the wire was extruded before the fracture became firmly fixed or when it worked its way deeper into the tissues and even migrated to other parts of the body. Glocker[4], in a recent issue of the *Military Surgeon,* reports an instance in which the wire migrated into the abdomen following fixation of a fractured femur, and Mazet[5] reports from the National Naval Medical Center a case in which, following blind wiring of an acromioclavicular joint, one wire backed out through the deltoid muscle and the other migrated into the lung, from which it was successfully removed. Bending the end of the wire and fixing it in the plaster will make impossible the occurrence of such catastrophies.

Summary

Having used this method in treating fractures of most of the bones of the extremities,

2. Murray, Gordon: A Method of Fixation for Fracture of the Clavicle, J. Bone & Joint Surg. 22:616-620 (July) 1940.
3. McKim, L. H.: A Method of Fixation for Fractures of the Sternum, Ann. Surg. 118:158-160 (July) 1943.
4. Glocker, R. K.: Migration of Kirschner Wire Into Abdomen Following Fixation of Fractured Femur, Mil. Surgeon, 92:315-317 (March) 1943.
5. Mazet, Robert, Jr.: Migration of a Kirschner Wire From the Shoulder Region Into the Lung, J. Bone & Joint Surg. 25:477-483 (April) 1943.

we believe it has the following advantages:

1. The technique is simple.
2. It disturbs the periosteum less than any other method of internal fixation.
3. It leaves a minimum amount of foreign material in the wound.
4. The presence of the wires does not interfere with the application of a supporting cast.
5. Bending the outer end of the wire and incorporating it in the cast prevent it from becoming displaced.
6. The wires can be removed as soon as the fracture has become firmly fixed and need not be left in place until complete bony union has taken place. It is a surgical maxim that any foreign material that is not intended to be permanent should be removed as soon as practicable.
7. Removal of the wires can be accomplished without discomfort to the patient, without disturbing the strength of the supporting cast, without a second incision, and without any danger of introducing infection into the wound.

NARCOLEPSY

With Report of Four Cases

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GRAHAM

Narcolepsy is a syndrome characterized by diurnal somnolence and cataplexy. The latter term refers to a loss of muscle tonus, involving sometimes a small group of muscles, and sometimes all the muscles of the body, and causing spontaneous attacks of powerlessness, sometimes referred to as hypnagogic cataplexy. Sometimes associated with this condition are amnesic states, transient ptosis, terrifying dreams, various degrees of irritability, and "sleep paralysis." This "paralysis" may be pre-dormitial or post-dormitial.

History

The majority of the cases of this disease have been reported in the past ten years. Rushton[1] reported 2 cases of "sleep paralysis" not associated with true narcolepsy. Westphal[2] gets credit for the first description of narcolepsy in 1877. Fischer[3] reported a case in 1878, and in 1880 Gelineau[4] published a report and proposed the term "narcolepsy." The significance of cataplexy as a symptom was first recognized by Loewenfeld[5] in 1902. Camp's contribution[6], published in 1907, was the first description of the complete syndrome to appear in American literature. In 1931 Cave[7] reported a series of 42 cases observed at the Mayo Clinic. The most detailed report was an excellent monograph by Daniels[8] reviewing the literature on narcolepsy up to 1934, and presenting 147 cases from the Mayo Clinic.

Incidence and Age of Onset

The disease seems to occur about three times as often in males as in females. Most cases apparently have their onset in the second and third decades of life.

Pathogenesis

The pathogenesis is still obscure. Much uncertainty still exists as to the pathology, but it is generally agreed that the disturbance is located in the cortex in the region of the third ventricle. Levin[9] has shown that there seems to be a sleep center located in this area. No autopsy has been performed except on one questionable case, that reported by Richard Bright in 1836. This was probably a tumor of the dura. Encephalograms on 22 patients with narcolepsy showed no definite abnormalities.

Diagnosis

The diagnosis of this disease is usually perfectly obvious from the history of untimely sleep and cataplexy, usually precipitated by strong emotion. When some underlying disturbance, such as organic brain disease, psychosis, endocrine disturbances, encephalitis, epilepsy or trauma, is associated with this syndrome, it is classed as symptomatic narcolepsy, in contrast with the idiopathic type.

1. Rushton, J. G.: Sleep Paralysis; Report of 2 Cases, Proc. Staff Meet., Mayo Clinic 19:51-54 (Jan. 26) 1944.
2. Westphal, C.: Eigenthuemliche mit Einschlafen verbundene Anfaelle, Arch. f. Psychiat. 7:631-635, 1877.
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Course

This disease does not appear to be progressive. Occasionally cases have been reported in which the patient apparently completely recovered. Seale Harris[10] reported a case associated with hyperinsulinism and cured by partial resection of the pancreas. Palmer[11] recorded a case showing spontaneous remission of the sleep component after eighteen months, but persistence of the cataplectic component.

Treatment

The first drug used in the treatment of narcolepsy was ephedrine sulfate. Effective doses, however, caused unfavorable side reactions. No further progress in treatment was made until the advent of amphetamine sulfate (benzedrine) in December, 1935. This drug acts as a specific in relieving the symptoms[12]. The daily dose varies from 20 to 110 mg. The only untoward side effects observed have been tachycardia and, rarely, skin eruptions. Dextro-amphetamine sulfate apparently gives fewer dermatologic reactions. In July, 1943, Eaton[13] of the Mayo Clinic reported 15 cases of narcolepsy treated with another drug, desoxyephedrine hydrochloride, for nine months. All but 3 patients expressed preference for this new drug over amphetamine sulfate.

Case Reports

I have had 4 cases of narcolepsy since 1936; all were treated with amphetamine, and in 1 case desoxyephedrine hydrochloride was used for six months.

Case 1.

G.D., a white married female, began having terrifying dreams when she was 20 years of age. Her past history was noncontributory and physical examination was essentially normal. Associated with these dreams were attacks of "sleep paralysis," which occurred as soon as she lay down for a nap. During these attacks she was conscious and would moan and struggle, but was unable to move. An attack would eventually be dispelled spontaneously, or merely by shaking her. At times she would have several attacks of "sleep paralysis" before finally going into a normal sleep. About a year after the onset of these attacks she found herself unable to stay awake while riding, attending the theatre, or playing bridge; a short nap was inevitable. After about six months the cataplexy component entered. Her knees would buckle under her, and she would drop anything she had in her hand. These attacks were precipitated by such trivial stimuli as an amusing joke or a good hand of cards.

When I saw her in 1936 this patient had been under observation for nine years and had run the gamut of treatment. In spite of a normal basal metabolic reading she was given thyroid for a period of one year with no apparent results. Ephedrine caused tachycardia and extreme nervousness, and its effectiveness in keeping her awake was doubtful. Since 1936 she has taken 10 to 30 mg. of amphetamine sulfate daily, with complete relief of symptoms. For six months desoxyephedrine hydrochloride was used. It was observed that this latter drug relieved the symptoms but did not give the euphoria experienced with amphetamine. At the present time dextro-amphetamine is used very satisfactorily.

Case 2.

J.W., a white male now 36 years of age, was 24 when he found himself unable to stay awake at work, particularly after lunch. At night he had terrifying dreams and much difficulty in going into a normal sleep. Upon hearing a joke or being amused he would sometimes have to sit down because his knees would buckle. This condition continued for two and a half years with no relief or diagnosis. Then he was put on amphetamine sulfate and his symptoms entirely disappeared. When the drug was discontinued for one day all symptoms recurred. Complete relief of symptoms is obtained by 40 mg. of amphetamine sulfate daily.

Case 3.

B.W., a white male 28 years of age, gave a history of a rather indefinite onset of narcolepsy, but his symptoms when he consulted me were typical. He frequently had to stop

10. Harris, Seale: Epilepsy and Narcolepsy Associated with Hyperinsulinism, J.A.M.A. *100*:321-328 (Feb. 4) 1933.
11. Palmer, H. A.: Narcolepsy Brit. M. J. 2:478 (Oct.) 1941.
12. (a) Myers, John W.: Narcolepsy (Case Report), Southwestern Med. 24:372-373 (Nov.) 1940.
    (b) Bloomberg, Wilfred: End Results of Use of Large Doses of Amphetamine Sulfate over Prolonged Periods, New England J. Med. 222:946-948 (June 6) 1940.
    (c) Ulrich, H.: Narcolepsy and Its Treatment With Benzedrine Sulfate, New England J. Med. 217:696-701 (Oct.) 1937.
    (d) Prinzmetal, M. and Bloomberg, W.: Use of Benzedrine for Treatment of Narcolepsy, J.A.M.A. *105*:2051-2054 (Dec. 21) 1935.
13. Eaton, L. M.: Treatment of Narcolepsy with Desoxyephedrine Hydrochloride, Proc. Staff Meet., Mayo Clinic, 18:230-236 (July 28) 1943.

his car for short naps, and at times could not remain awake in spite of cold air, loud noises, or incessant smoking. At night, upon going to bed, he would think that people were in the room while he, although perfectly conscious, was unable to move. Shortly afterwards he would wake up in a cold sweat. When he was amused he would sometimes drop anything in his hand. Amphetamine entirely relieved his symptoms, allowing him to continue his work as a salesman and to sleep normally at night.

Case 4.

L.J., a white male of 28 years of age, began dropping books or falling down when he was amused. During these attacks he could not focus his eyes and would see double. In movies he would fall asleep, no matter how interested he was. Usually after a heavy meal he was obliged to take a short nap, waking refreshed. These symptoms were entirely relieved by amphetamine.

Discussion

Following prolonged use of amphetamine sulfate in these 4 cases there has been no abnormality of temperature, pulse, respiration, basal metabolic rate, blood pressure, blood, kidneys, or liver. Further, there is no evidence of addiction or habit formation, although some tolerance is developed. Although I have used desoxyephedrine hydrochloride in only 1 case, for a period of six months, no untoward reactions were observed during that period. Amphetamine was preferred by this patient, however, because of the increased sense of well being which it afforded.

Summary

1. A brief review of the history, symptoms and course of narcolepsy has been presented.

2. Four cases in my own practice have been reported and their treatment has been described.

THUMBNAIL SKETCHES OF EMINENT PHYSICIANS

JOSIAH C. TRENT, M.D., *Editor*

DURHAM

THE EVOLUTION OF THE ASEPTIC PRINCIPLE IN SURGERY

II

ANTONY VAN LEEUWENHOEK

(1632-1723)

"Father of Bacteriology"

The discovery of bacteria, another milestone in the advance toward the aseptic principle in surgery, was preceded by numerous theories and hypotheses as to the cause of contagions and infections. Some suggested that the air contained floating bodies or evil vapors capable of producing disease. Fracastoro (1483-1553) propounded some remarkable theories of contagion. His hypothetical "seminaria" suggest our own bacteria. Athanasius Kircher (1602-1680) actually saw "worms" in the blood of plague victims. But the credit for first seeing and describing bacteria and thus reducing previous theories and speculations to actuality belongs to Antony van Leeuwenhoek[1], a draper of Delft, Holland, who ground his own lenses, constructed his own microscopes, mounted his own specimens and subsequently made countless highly original observations on everything from teeth scrapings to the chalk cliffs of Dover.

This extraordinary man, born the son of a basket maker, learned the draper's trade in Amsterdam and subsequently returned to Delft, where he practiced his trade.

During a life of 91 years he was married twice, had six children—only one of whom outlived him—held several municipal offices, and was in general a good, respectable and respected citizen of the community. He became an expert lens grinder but never disclosed his technique. He constructed hundreds of microscopes during his lifetime but rarely gave one away and never sold one. At the time of his death he had 257 completed microscopes and 172 mounted lenses. Today, however, only eight authentic examples survive and none is in the United States or England. All his microscopes were made with simple lenses, although the compound microscope had been known since 1608. Leeuwen-

1. Much of the following information was taken from Clifford Dobell's book, *Antony van Leeuwenhoek and his Little Animals*, New York, Harcourt, Brace and Co., 1932.

hoek's microscope consisted of a single biconvex lens of short focal length (9 mm.) with a maximum magnification of 200-300 times, mounted between two metal plates, usually brass, measuring approximately 2 by 4 cm. Fixed to the plates was a simple "mechanical stage." The object to be examined was glued to the "stage" (a sharp pin or screw), and by manipulation of the thumbscrews was adjusted to the focal point of the fixed lens. The lens was placed close to the eye and the whole held over a natural or artificial source of light. Leeuwenhoek had remarkable eyesight and unbounded patience, but many of his observations were so unique that this method fails to account for them. He states frequently in his letters that he had a "special method" of observing, a secret which he carried to his grave. Dobell thinks, however, that he must have hit upon some method of dark field illumination to have seen motile bacteria as clearly as he did.

Using this simple but highly effective microscope Leeuwenhoek made many important discoveries. All his findings he communicated to the Royal Society of London, of which he was a member, in some three hundred and seventy-five letters spaced over a period of sixty-five years. These he wrote in old fashioned Dutch, since he knew no other language.

> Leeuwenhoek was the first to describe the spermatozoa . . . ; gave the first complete account of the red blood corpuscles . . .; discovered the striped character of voluntary muscle and the structure of the crystalline lens; was the first to see protozoa under the microscope . . .; found microorganisms in the teeth, giving, for the first time, accurate figurations of bacterial chains and clumps, as well as of individual spirilla and bacilli; and demonstrated the capillary anastomosis between the arteries and veins, which Malpighi had already seen in 1660 without attaching much importance to it.[2]

Leeuwenhoek in his later years had numerous visitors, among them rulers and potentates of many countries. He disliked having his work interrupted by the merely curious but received kindly those who were genuinely interested. He jealously guarded his instruments and took measures to prevent their loss. One contemporary visitor's account, while revealing something of Leeuwenhoek's character, also indicated that all was not well between the Dutch and Germans even then: "When he had shown two

2. Garrison, F. H.: An Introduction to the History of Medicine, ed. 4, Philadelphia, W. B. Saunders, 1929, p. 254.

Fig. 1. Title page of the last volume of the Dutch collective edition of Leeuwenhoek's Letters (1718) containing an inset portrait of the author from a miniature by J. Goeree. (Author's collection)

or three of his microscopes he took them away and went to look for as many others; saying that he did this for fear lest any of them might get mislaid among the beholders because he didn't trust people, especially Germans; and he repeated this two or three times."

Leeuwenhoek was an extremely accurate observer and never spoiled his observations with speculations—a fact which probably saved him from oblivion. In a letter to a friend Leeuwenhoek beautifully set down his "articles of faith," which might well serve as a guide for us today!

> I must say to you as I oft-times said already that 'tis not my intention to stick stubbornly to my opinions, but as soon as people urge against them any reasonable objections, whereof I can form a just idea, I'll give mine up and go over to the other side: especially because my efforts are ever striving towards no other end than as far as in me lieth to set the Truth before my eyes, to embrace and to lay out to good account the small Talent that I've received; in order to draw the world away from its Old-Heathenish superstition; to go over to Truth, and to cleave unto it.

J.C.T.

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FEBRUARY, 1945

STATE SOCIETY MEETING POSTPONED

Secretary Roscoe McMillan's message in this issue is brief, but very important. For the first time since the Civil War, the annual meeting of the Medical Society of the State of North Carolina has been postponed indefinitely. "All officers and committees are continued in office until such time as it will seem practicable to have our next meeting." This action was taken by unanimous vote of the Executive Committee "after very careful consideration of all factors involved," in the interest of the nation's war effort. Doubtless the members of the Committee felt that while the Allies are engaged in the supreme effort to crush Hitlerism, the least we at home can do is to cooperate to the fullest extent in saving every possible drop of gasoline.

One of the most deeply ingrained traits of human nature is to look for a scapegoat to take the blame for unpleasant events. We have no difficulty on this score. If his Satanic Submajesty, Herr Schickelgruber, had remained content with his humble career as a paperhanger, think how much suffering the world would have been spared! Let us hope that his mad career will soon come to an end, and once more peace will come to the world.

* * * *

HAVE THE ARMED FORCES CRIPPLED MEDICAL EDUCATION?

The *Saturday Evening Post* for January 27 carries a thought-provoking article by Dr. Evarts Graham, Professor of Surgery at Washington University, asking—and fully answering—the above question. It should be read by every doctor in the country, and—more important—by those who determine the policies of our army and navy.

Dr. Graham recalls the lack of adequate preparation for war when Pearl Harbor was bombed, but says that "in at least one respect . . . we were very well prepared. We had the largest group of the most splendidly educated medical specialists in our whole history." These men were rapidly mobilized, and went to work without needing any further medical training. The medical profession is the only large group, except professional soldiers, that did not have to be drafted into service. The work of our medical officers has had much favorable comment ever since our entrance into the war.

As Dr. Graham says, the record made by American medicine in this war is only what was to be expected, for it is generally accepted that American doctors are the best trained in the world. It is all the more amazing, then, that "the Army and Navy have adopted policies which have already effectively prevented our medical schools and hospitals from continuing the supply of trained doctors for the armed services."

Dr. Graham briefly reveiws the revolution in medical education that has taken place since 1904, when the American Medical Association created its permanent Council on Medical Education to inspect and grade medical schools (and later, hospitals). This step was followed by the formation of the American Colleges of Surgeons, Physicians, Roentgenologists and Chest Physicians, and

of other organizations designed to stimulate better professional work; then by the creation of the fifteen specialty boards for the certification of specialists. This revolution was accomplished by the medical profession itself, without legal compulsion. Not only were the standards of medical schools raised immeasurably, but hospital training was likewise made more and more worth while.

The Army and Navy now are reaping the benefits of this educational program. Do they appreciate this fact? Judging from their actions, they are so far from appreciating the type of medical service they are getting that they are apparently doing their utmost to sabotage our medical schools and hospitals. Not content with cutting the premedical requirements to a dangerously low level, reducing medical school faculties by 40 per cent, and rushing the stripling students through their medical course at a dizzy speed, they have reduced to a ridiculous minimum the hospital training so essential to produce the highly trained doctors who now make up the bulk of our profession in service.

"Few would believe that the Army, in need of well-trained surgeons, would destroy the only plan of producing them that has been found to work efficiently . . . It is these eager but inadequately trained young officers who will serve . . . where expert surgical judgment is often needed." What is true of surgeons is equally true of medical men.

Still another way in which medical education is being sabotaged is by the decision not to defer any more medical students who are fit for military service. "The only replacements for the doctors who are dying out are the insufficient number of men rejected because of physical defects, and women."

In Dr. Graham's words, "We have been spending our capital . . . If the war proves to be a long one, the need of the armed services for well-trained medical officers will become urgent . . . The health of the home front . . . is now seriously jeopardized by the virtual destruction of graduate medical education."

This article strengthens the position taken by the NORTH CAROLINA MEDICAL JOURNAL more than three years ago[1]—that the ratio between the physicians allotted to the defense forces and those left in the civilian population is altogether disproportionate. Although about 40 per cent of our doctors are in service, there have been, thus far, approximately 32 civilian deaths to one in the services. Deaths from accident in the civilian population have been two and one half times as many as deaths from combat in the armed forces.

Another point which Dr. Graham might well have made is that when the health of the people begins to suffer because of the shortage of doctors brought about by the present program, we may expect the politicians to step in and demand that the control of medical practice be taken over by the government.

1. Medical Care for Military and Civilian Population, Editorial, North Carolina M. J. 2:560 (Oct.) 1941.

* * * *

BRITISH DOCTORS AND COMPULSORY INSURANCE

In *Collier's* for January 27 appears an article by Miss Amy Porter, entitled "Do We Want Compulsory Health Insurance?" In the concluding paragraph of this strongly biased and frequently misrepresentative article are found these two sentences: "No country which has tried compulsory insurance has ever abandoned it. The organized doctors of Great Britain strongly favor more, rather than less, compulsory insurance."

The reason for the truth of the first statement was given by Grover Cleveland many years ago: "The cohesive force of public plunder." One wonders where Miss Porter gets her authority for the second sentence. Certainly not from British medical journals. These have been filled with discussions of state medicine *pro* and *con*, but mostly *con*. An example of the attitude of the average British doctor is to be found in the *South African Medical Journal* for October 14, in an article by G. H. Alabaster, M.D., F.R.C.S. (Ed.), M.R.C.O.G., entitled "A State Service Criticism." Dr. Alabaster says: "Events are moving too fast for us to be blind to the fact that an attempt is being made to rush through 'catch-vote' legislation with a haste rather political than health-searching . . .

"The concern of people in general, in so far as they are aware of the issues, is for their own welfare, quite irrespective of ours. They have been told by the physician novelists, such as Cronin, that our treatment is expensive but not good, and to that outcry there has been, unfortunately, no adequate reply. In consequence we have fallen from grace in the opinion of the public. As

a profession we know all is not perfect in our work; we know, indeed, it never can be; we have acknowledged the fact so ardently that our self-questionings have been interpreted as self-accusation. But our worse mistake has been that we have allowed it to be taken for granted that State Medical Service is a certain road to perfection in our work."

And a report from the British Medical Association on the White Paper proposition includes these observations:

"The medical profession *will resist* any control by the State, either political or administrative, which is inconsistent with their intellectual and professional freedom. They fear political influence on medical matters. They fear bureaucracy and red-tape. They fear subservience of the clinical to the administrative."

Do these quotations support Miss Porter's statement that "The organized doctors of Great Britain strongly favor more, rather than less, compulsory insurance"?

* * * *

A LAYMAN LOOKS AT DOCTORS

This JOURNAL has had occasion in the past to quote from Winston-Salem's printer-philosopher, Mr. John Wesley Clay, whose syndicated column, "My Notions," appears in a number of daily papers. His column for January 19 paid a splendid tribute to the medical profession:

"Time was when typhoid fever was an annual scourge in these parts. Hardly a family escaped its ravages. The victim would languish for days with a burning fever, his strength would ebb away, and after suffering from one to two weeks would either die or recover, sometimes remaining a semi-invalid for a long time. The disease was no respecter of persons. It attacked the robust and strong as well as the physically weak.

"But thanks to the modern doctor typhoid fever has been put to rout. One of the greatest sources of income to the old-fashioned family physician has been done away with, by the doctors themselves, in the elimination of typhoid fever.

"That is one of the reasons why we hold the medical profession in such high esteem. Disease is bread and butter to the physician, yet he deliberately kills his source of income. They are among God's noblemen. We would hate to see government or politics interfere with this brilliant and noble class of men."

DIAMOND ANNIVERSARY OF THE RALEIGH ACADEMY OF MEDICINE

On February 2 the Raleigh Academy of Medicine celebrated its seventy-fifth anniversary with a dinner meeting at the Hotel Sir Walter. Dr. Hubert Royster, who is the oldest living Fellow of the Academy, both in years and in length of fellowship, prepared the program and acted as toastmaster. After Dr. V. M. Hicks, president of the Academy, had welcomed the guests, Governor R. Gregg Cherry brought greetings from the state, Mayor Graham H. Andrews, from the city, and President Paul Whitaker, from the State Medical Society. Dr. Charles P. Eldridge then spoke on "Our Past Twenty-Five Years," and the guest speaker, Major General George F. Lull, reviewed "Some Wartime Problems of the Medical Department and Some of Its Accomplishments."

The Raleigh Academy of Medicine is the oldest local medical organization in North Carolina which has preserved its continuous existence. It has furnished twelve presidents to the State Medical Society; five of these were founders of the Academy.

* * * *

MAJOR EDWARD HARRISON

To the long and constantly growing list of medical men who have given their lives in the service of their country must be added the name of Major Edward T. Harrison of High Point, who died at the Moore General Hospital on December 18.

Dr. Harrison did not have to go into service, for he had reached an age that would have allowed him to stay at home and care for his large and loyal practice without fear of criticism. The call of duty was so strong, however, that he volunteered in July, 1942, and was at once commissioned a major. He left this country in December, 1943, and spent a year in the Pacific as Chief of Surgical Service, 37th Station Hospital. While in New Guinea he contracted dysentery, from which he never fully recovered. He continued at his post of duty until it was evident to his fellows that he was mortally stricken, and died within a few days after being flown to the Moore General Hospital. The final cause of his death was given as aplastic anemia, but Major Harrison was as truly a casualty of the war as if he had been killed by a bullet or bayonet.

"Greater love hath no man than this, that a man lay down his life for his friends."

CASE REPORTS

CLINICO-PATHOLOGICAL CONFERENCE

DUKE HOSPITAL
DURHAM

DAVID CAYER, M.D.
and
I. N. DUBIN, M.D.

DR. CAYER: A 59 year old white, married male was admitted complaining of "inability to eat anything" for the past two years, weight loss, weakness, and jaundice.

The family and marital histories were non-contributory. Approximately thirty years ago the patient had had jaundice; otherwise he had always been well.

The patient stated that two years before entry, following the extraction of all his teeth because of dental caries, he began to lose his appetite. He experienced nausea and vomiting on occasions, but no abdominal pain. He became gradually weaker over the period of two years, and his weight dropped from 175 to 153 pounds. Several weeks before entry icterus was noted, and at approximately the same time the stools became light in color. The jaundice increased until the time of admission. The patient had always been constipated and had had no diarrhea or bloody stools. At another hospital, one week prior to entry here, he received three transfusions because of "low blood," and a rather large amount of quinine, although no history of malaria was obtainable.

Physical examination showed his temperature to be 38.5 C., his pulse 88, respiration 20, and blood pressure 120 systolic, 70 diastolic.

The patient was an obviously ill, toxic, drowsy, nauseated, weak, cachectic, deeply icteric white male with extremely pale mucous membranes. No spider angiomas or purpuric spots were noted.

The eyegrounds were not remarkable. The tongue was dry, red and smooth. Complete edentia was present. Soft, enlarged lymph nodes were present in both superior cervical triangles and in the left axilla. A hard node 2 to 3 cm. in diameter was present in the left supraclavicular region.

The lungs were not remarkable. The heart was moderately enlarged to the left and an apical systolic murmur was present. The abdomen was distended and there was a questionable fluid wave. No prominence of the superficial veins was noted. The liver was moderately tender and extended 6 cm. below the costal margin into the midepigastrium, but no mass was palpable. The spleen was hard and extended 8 cm. below the costal margin in the anterior axillary line. Examination of the abdomen three days after entry, when the patient was much more relaxed, revealed several hard nodules easily palpable in the abdomen; their exact location was not given in the record. There was no edema.

The hemoglobin was 9.5 Gm. or 61 per cent, red blood cells 2,980,000, white blood cells 5850, with 59 per cent segmented polymorphonuclears, 16 per cent nonsegmented polymorphonuclears, 2 per cent juveniles, 4 per cent small lymphocytes, 5 per cent large lymphocytes, and 14 per cent monocytes. The color index was 1.05, the mean corpuscular hemoglobin content 13, the mean corpuscular volume 93, reticulocytes 2.5 per cent, platelets 250,000. Bone marrow studies showed a total nucleated cell count of 15,000, with 10,000 white blood cells and 4 per cent reticulocytes. A differential bone marrow white cell count showed 43 per cent segmented polymorphonuclears, 22 per cent nonsegmented polymorphonuclears, 11 per cent juveniles, 2 per cent myeloblasts, 1 per cent undifferentiated myelocytes, 6 per cent neutrophilic myelocytes, 2 per cent small lymphocytes, 2 per cent large lymphocytes, 1 per cent plasma cells and 1 per cent monocytes. Four normoblasts and 41 erythroblasts were found per 100 white blood cells. Hematologic study indicated a relatively empty bone marrow and an elevated monocyte count in the peripheral blood.

The stool was soft and light brown; the benzidine test and microscopic examination were negative; no bile pigment test was done. The urine showed a specific gravity of 1.013 and no sugar or albumin; it was negative microscopically, except for several granular casts, and the benzidine test was negative. No urobilinogen or bile pigment test was recorded.

Serological studies of the peripheral blood were negative. Blood chemistry studies were as follows: nonprotein nitrogen 56 mg. per 100 cc. on admission, Van den Bergh reaction direct, bilirubin 16 mg. per 100 cc., phosphorus 3 mg. per 100 cc., phosphatase

17 Bodansky units per 100 cc., vitamin A 37 international units per 100 cc. (normal), carotene 221 international units per 100 cc.; total proteins 5.8 Gm. per 100 cc.—albumin 2.4, globulin 3.4 Gm. Blood cultures showed no growth.

An x-ray of the chest revealed some clouding in the right mid-lung field. The diaphragms were smooth. The heart was slightly enlarged to the left. A flat plate of the abdomen showed a large amount of gas in the stomach. The liver and spleen appeared enlarged; no other changes were visible.

The nonprotein nitrogen one day before death was 213 mg. per 100 cc. A blood count made one day before death showed a hemoglobin of 47 per cent, 2,250,000 red blood cells and 9500 white blood cells, with 58 per cent segmented polymorphonuclears, 18 per cent nonsegmented, 4 per cent juveniles, 1 per cent undifferentiated myelocytes, 10 per cent small lymphocytes, 1 per cent large lymphocytes, and 8 monocytes. There were 1 normoblast and 2 erythroblasts per 100 white blood cells. The platelet count was 150,000.

Course in Hospital: The patient's temperature varied between 37.4 and 39 C., with a rather slow swing and a corresponding pulse rate throughout his first hospital week. During the second week his temperature dropped below the base line for several days, but during the few days immediately prior to death averaged 37.2 C., the pulse still in proportion. A biopsy of the hard node in the left supraclavicular region was obtained, and the report is being purposely withheld by the pathologist. The patient at no time roused from the stuporous, drowsy state, which progressed to coma. He expired quietly in coma on his thirteenth hospital day. Therapy consisted of supportive measures, including parenteral sodium chloride, dextrose and vitamins.

Discussion

DR. CAYER: The problem is that of a gradually progressive illness of approximately two years' duration in a 59 year old white man. That the patient dates his loss of appetite to the period following the removal of his teeth does not mean that the two facts are necessarily related. Removal of teeth—unfortunately all too common—would hardly account for persistent anorexia. In gradual sequence nausea, vomiting, weakness, weight loss and jaundice developed. While there is a previous history of jaundice thirty years ago, the complete absence of any other history of colic, intolerance to fats, or digestive complaints in the interim rather indicates that this was probably catarrhal jaundice. One week before admission to this hospital he received three blood transfusions and was given large amounts of quinine, although there is nothing to suggest that he had malaria. We may assume that he was anemic and febrile at this time. Throughout the history the absence of any mention of pain is striking. The physical findings of semi-coma, icterus, pallor, and enlargement of peripheral nodes, liver and spleen bring us to a consideration of the conditions which might produce this picture, some of which may be ruled out quite easily.

Multiple myeloma can be passed over because of the absence of pain or skeletal involvement, auto-agglutination, Bence-Jones protein, elevated serum globulin, or plasma cells in the sternal marrow.

Lymphosarcoma originates usually in the mediastinal and cervical nodes and is rarely a cause of splenomegaly. Cachexia is not a part of the clinical picture but occurs only as a terminal event.

Primary carcinoma of the liver is relatively uncommon. Enlargement of the spleen and peripheral nodes usually does not occur, and the average duration in untreated cases is three to twelve months. The history of two years' duration, if correct, would rule out this diagnosis.

Secondary carcinoma of the liver is a far more likely possibility; the most frequent primary sites are the colon, gallbladder and bile passages, and the stomach. The complete absence of changes in bowel habits or in stools, and the absence of bleeding or obstruction over a period of two years would probably eliminate the colon as a primary site. With *primary carcinoma of the gallbladder or ducts,* a history of previous gallbladder infection or colic is the rule, while marked splenomegaly is not. Also, jaundice occurs early and is usually accompanied by pain. Severe and rapidly progressive jaundice characterizes *carcinoma of the head of the pancreas,* and the picture of anemia, with splenic and lymph node enlargement does not fit this diagnosis at all. Contrary to what is generally written, about 40 per cent of such patients give a history of pain at some time.

Carcinoma of the stomach is a distinct possibility. The insidious onset of anorexia, followed by nausea and vomiting, is highly suggestive. Anemia secondary to an infiltrative lesion of the stomach is well recognized, and the hepatomegaly and jaundice could result from metastases. Fever is a frequent finding in abdominal malignancies. In carcinoma of the stomach it is uncommon except when metastases have occurred. Against this diagnosis are the following facts: It is specifically stated that no epigastric mass was felt. While untreated carcinoma of the stomach might have a duration of two years, it would be unlikely. Marked splenomegaly is uncommon, and it is reasonable to expect pain, at least during the last few months. We have no information as to the amount and character of the vomitus, both of which are of extreme importance in diagnosis. It is stated, however, that the stool benzidine test was negative. If this statement is the result of more than one test it is highly significant, since 90 to 95 per cent of the patients with advanced carcinomas of the stomach have occult blood in the stools, with a positive benzidine test. Bleeding may also occur as an early symptom.

The entire sequence of events in this case can be adequately explained by one clinical entity—namely, *Hodgkin's disease*. While it is true that this diagnosis is most frequently brought to mind by painless enlargement of the cervical nodes, the abdominal form is not uncommon. It is in this particular type that the fever is most prominent, along with enlargement of the liver and spleen.

The statement is made in some texts of pathology that the spleen is always enlarged, and in probably 60 per cent of the cases can be palpated. Constitutional symptoms are often lacking in the early phase of the disease, but once the disorder is well developed, weight loss and cachexia usually are marked. Pain is not usually pronounced unless it is due to pressure or to bone lesions. The blood picture, while not diagnostic, may be helpful. A low white blood cell count is frequently found in patients with abdominal Hodgkin's disease. Monocytosis is suggestive of Hodgkin's, as is eosinophilia. The resistant anemia probably represents an invasion of the bone marrow. In untreated cases the average duration is two or three years, which is entirely compatible with this history. Jaundice may result from obstruction caused by enlarged nodes at the liver hilus or from actual invasion of the liver by Hodgkin's tissue, with compression of the bile canaliculi. The rapidly rising nonprotein nitrogen is of interest in this case. We do not know from the history whether anuria developed before death. Possible explanations for the rising nonprotein nitrogen would include obstruction of the ureters by tumor masses, actual infiltration of the renal substance, extra-renal azotemia due to fall in blood pressure, anoxemia, and the possibility that owing to the extensive liver destruction, the nonprotein nitrogen as measured represented primarily amino acids. A urea ratio might have been helpful.

Dr. Cayer's Diagnosis

1. Hodgkin's disease with involvement of abdominal and peripheral nodes, liver, spleen and bone marrow.

Anatomical Discussion

DR. DUBIN: The left supraclavicular node removed for biopsy showed the typical picture of Hodgkin's disease. At autopsy the main findings were an infiltration of the liver, spleen, bone marrow and lymph nodes by Hodgkin's tissue. The periaortic lymph nodes were especially enlarged. The spleen weighed 750 Gm. (normal weight 160 Gm.) and the liver 2,350 Gm. (normal weight 1550 Gm.). The jaundice was due to the obstruction of the intrahepatic bile ducts by the diffusely proliferating Hodgkin's tissue. The lymph nodes around the extrahepatic bile ducts were not particularly enlarged and did not play a part in the production of the jaundice. There was a fresh terminal lobular pneumonia.

I cannot explain the elevation of the nonprotein nitrogen, for although there were bile casts in the renal tubules there was no demonstrable damage to the glomeruli, the tubular epithelium or the interstitial tissues; therefore, I have no basis for saying that the elevated nonprotein nitrogen was of renal origin.

Anatomical Diagnosis

1. Hodgkin's disease with involvement of the liver, spleen, bone marrow, and lymph nodes.

2. Jaundice due to obstruction of the intrahepatic bile ducts by proliferating Hodgkin's tissue.

TUBERCULOSIS ABSTRACTS

A Review for Physicians

ISSUED MONTHLY BY THE NATIONAL TUBERCULOSIS ASSOCIATION

VOL. XVIII FEBRUARY, 1945 No. 2

TUBERCULOSIS among older people remains one of the stubborn pockets of resistance in the general campaign aimed at the eradication of the disease. For the most part we must rely upon the general practitioner to carry out this phase of the struggle, for the individuals concerned are usually among his patients and outside the range of the present "mass" control measures.

TUBERCULOSIS IN ELDERLY PEOPLE

The importance of tuberculosis in elderly people, especially pulmonary tuberculosis, has been generally underestimated. One reason for this is that few of us have any conception of the number of older people among us. There are in the United States nearly four thousand persons over 100 years old; over 87 thousand who are past 90; more than one million who are over 80; more than five million over 70; and 13.5 million over 60. These, with 13 million in their fifties, make a total of over 26.5 million persons over 50, more than 20 per cent of the whole population.

The U. S. Census figures for 1870 showed only about 11 per cent of the population over 50 at that time. A reduction in mortality from infectious disease, increased application of sanitary science, better housing and nutrition are all contributing to the longer life of the present day. How permanent the present large percentage of older people in the population will be, we cannot tell. Continued wars followed by widespread epidemics, may again reduce life expectancy to that of the middle ages.

Now, however, when about one fifth of our population is elderly, it is important that we know how much of it harbors tuberculosis, and how much of a menace to the community this represents. Is tuberculosis in the later decades of life increasing?

Figures from the U. S. Census Bureau show that the mortality rates from tuberculosis in the United States in 1940 were much higher in the later decades of life than among young people. The highest rate in 1940 at any age period, that of males between 55 and 65, was 110 per 100,000. In 1900 the highest rate for males, 362 per 100,000, was in the age period 35 to 39.

The death rate from tuberculosis is still relatively high in persons over 50, and since this group forms about 20 per cent of the population, there are many elderly tuberculous persons in the country. Using the very conservative factor of five active cases for every death, the active cases, many of which are spreading infection, may be estimated as at least 100,000. Not all of these cases are in sanatoria.

Pathology

There has been a great deal of controversy regarding the seriousness of tuberculosis in old people. Some have considered it relatively benign, while others have thought it rapidly progressive. In one report of a series of 142 cases over 55 years of age admitted to a sanatorium, many of the patients had active tuberculosis with positive sputum for periods of from 10 to 40 years. The number of tubercle bacilli eliminated by sputum-positive cases which remain positive for periods as long as 10, 20, 30 or 40 years, can only be faintly realized or comprehended, in this respect being comparable only to national expenditures for war and other purposes.

The patients in sanatoria are for the most part those with active or progressive lesions. Probably a large proportion of the fibrotic cases with few symptoms are at home. This circumstance makes it difficult to determine the typical characteristics of pulmonary tuberculosis as it affects elderly people.

Aging tissues are said to be less susceptible to inflammatory processes than growing ones, and tend to develop fibrous change. Obliteration of lymphatic channels and involutional changes take place which may render the body resistant to the spread of tuberculosis. On the other hand there is probably

concomitant atrophy, decalcification and dehydration. A few individuals may reach old age without previous infection and develop primary tuberculosis, not always distinguishable clinically from reinfection tuberculosis.

Many elderly persons who have definitely recognizable tuberculous lesions with positive sputum have become somewhat immune to the toxic effects of their disease, and make up a highly infectious class. In this group are included the so-called "good chronics" with positive sputum who do not consider themselves ill. Some of them care for young children or are otherwise in close contact with susceptible persons.

The course of events in any individual case is dependent not only on exposure to fresh infection or on the reactivation of old quiescent foci, but also on the endowment of the individual with more or less resistant tissues. Although tuberculosis may only become manifest and troublesome in later life, its origin usually is to be sought in an earlier period.

Differential Diagnosis

While tuberculosis is relatively common in later life, its detection is frequently difficult. Diseases likely to cause confusion are frequently met. Included among them are cancer, cardiovascular disease, chronic bronchitis, emphysema, bronchiectasis, asthma and silicosis. If the sputum does not contain tubercle bacilli, the differentiation becomes increasingly difficult. Cough, weakness, loss of weight, hemoptysis and other symptoms found in tuberculosis may be present in other conditions with consequent difficulty in differential diagnosis.

Many cases of tuberculosis in older people are not detected because few of them have had chest X-rays. Most of the surveys have been among children and young people who are much more easily persuaded to cooperate. It has been difficult to secure the consent of older people for examination. They pay less attention than young people to declining health, which they feel is to some extent inevitable. Their tired feeling they consider a normal accompaniment of old age. They do not like to change their environment and are fearful lest there may have to be radical alterations in their way of living. Inertia and dread of loss of security make them hesitate.

Methods of search for unsuspected cases of tuberculosis, however, are changing. The X-ray, our most valuable resource for this purpose, is being used more freely since it is becoming less expensive. An X-ray of the chest will soon be part of the routine examination of all patients seen by physicians in their offices, just as it is now becoming a part of up-to-date clinic practice.

Treatment

The treatment of tuberculosis in old people is in many respects the same as it is for those in early life. Rest of the inflamed area is the keynote and will probably be necessary even if some day some form of chemotherapy is found. Certain difficulties in the rest treatment of elderly patients are apparent. Complete immobilization is not well borne by the aged and mechanical measures to secure lung rest are less applicable for them. Symptomatic treatment and good nursing may bring good results where mechanical adjuncts to bed rest are not advisable. Exceptional cases will doubtless have to remain at home. The physician should, however, not accede to such a plan without a full realization of the risks involved, and the possibility of infecting an entire family and a new generation.

The entire population needs and deserves good medical supervision. Persons with arrested tuberculosis, in order that they may be kept from reactivating their lesions and becoming spreaders of tubercle bacilli need more than the average medical attention. Older persons in this category will require as much consideration and follow-up as younger patients.

Tuberculosis in Elderly People, A. T. Laird, M.D., The Journal-Lancet, June, 1944.

CORRESPONDENCE

New Guinea

Members of the Editorial Board and
Medical Society of the State of North Carolina

Gentlemen:

For more than a year it has been appropriate that I express my gratitude for receiving the Medical Journal so regularly. It is indeed a great help and I find it more interesting here than when I was in the States. Of the medical men whom I know from so many states, none receive their state journal gratis, as we do. Thanks.

(Signed) CREIGHTON WRENN
Captain, Medical Corps

MEDICOLEGAL ABSTRACT

J. F. Owen, M.D., LL.B.
Raleigh

Evidence: *A medical expert may base his opinion upon the clinical history, his observations, and the patient's description of his symptoms.*

The plaintiff in this case sustained injuries while riding on a passenger train which collided with a freight train.

In Superior Court it was brought out by testimony that there had been no objective findings such as broken bones or abrasions of the skin. Despite this fact the plaintiff's physicians were allowed to testify concerning the patient's exclamations and other verbal indications of pain, and his inability to handle himself normally, and they were also permitted to give opinions based upon those facts as well as upon the appearance of the plaintiff at the time of their examinations. One of the physicians was allowed to state that when he examined the plaintiff shortly after the injury, the latter was unable to draw up one of his legs except very slowly, and complained of pain whenever he moved. Other physicians who examined the plaintiff at the time of the trial, and immediately before that time, testified about tests that were made to determine whether the legs of the plaintiff were paralyzed. They all gave opinions based upon what may be termed a clinical history of the case, their own observations, and the results of the tests which they performed.

The judgment in Superior Court was for the plaintiff. The defendant appealed to the Supreme Court, and among other errors alleged, objected to the testimony of the physicians concerning the extent of the plaintiff's injuries.

When this case was considered by the Supreme Court, this tribunal stated in substance that a medical expert may base his opinion on the clinical history of a case under consideration, and in order to make his testimony intelligible, may testify as to the observations that he made, and also as to what his patient said to him in describing his bodily condition and the character and manifestations of his sickness. The reason for this rule is that, of necessity, the physician must often take such statements into consideration in reaching a conclusion as to the physical condition of the patient, and the nature and extent of his malady or injury. The rule being founded on such necessity, it has been declared that it must be applied with caution, and not extended beyond the reason of necessity upon which it rests. The Court further stated that the mere statement made by a patient for the sole purpose of furnishing the expert with information on which to base an opinion is not admissible, and that the witness in testifying to what he has heard and observed is confined to exclamations, shrinkings, and other expressions which appear instinctive, involuntary, and spontaneous. (Arkansas Supreme Court, Spring Term, 1915, Vol. 176 S. W. 134.)

BULLETIN BOARD

SECRETARY'S MESSAGE

The Executive Committee of the Medical Society of the State of North Carolina, after very careful consideration of all factors involved, voted unanimously to postpone the Ninety-Second Annual Session, which was scheduled to be held at Pinehurst April 30, May 1 and 2, until the ban for conventions is lifted.

This action was taken voluntarily in order to cooperate to the fullest possible extent with the request of the Office of Defense Transportation and in the interest of the nation's war effort.

All officers and committees are continued in office until such time as it will seem practicable to have our next meeting.

Roscoe D. McMillan, M.D.
Secretary-Treasurer

* * * *

Minutes of Meetings of the Executive Committee, Legislative Committee, and Committee to Advise with Members of the Governor's Commission to Extend Medical and Hospital Care in North Carolina

December 31, 1944

A joint meeting of the Executive Committee, the Legislative Committee, and the Committee to Advise with Members of the Governor's Commission to Extend Medical and Hospital Care in North Carolina was held with the Governor's Commission to Extend Medical and Hospital Care in North Carolina at the Governor's Mansion on Sunday afternoon, December 31, 1944, at 2:30 o'clock.

The following were present:

Executive Committee:
- Dr. Paul F. Whitaker, President
- Dr. Zack D. Owens, Second Vice President
- Dr. Roscoe D. McMillan, Secretary-Treasurer
- Dr. John Cotten Tayloe, Councilor Second District
- Dr. Newsom P. Battle, Councilor Fourth District
- Dr. F. L. Knight, Councilor Fifth District
- Dr. M. D. Hill, Councilor Sixth District
- Dr. Fred M. Patterson, Councilor Eighth District
- Dr. I. E. Shafer, Councilor Ninth District

Legislative Committee:
- Dr. Hubert B. Haywood, Chairman
- Dr. Ben F. Royal
- Dr. P. P. McCain
- Dr. W. M. Coppridge
- Dr. Donnell B. Cobb

Committee to Advise with Members of the Governor's Commission to Extend Medical and Hospital Care in North Carolina:
- Dr. George L. Carrington
- Dr. V. M. Hicks
- Dr. T. L. Carter
- Dr. Erick Bell
- Dr. G. G. Dixon
- Dr. Fred M. Patterson
- Dr. Julian Moore
- Dr. M. D. Hill
- Dr. I. E. Shafer
- Dr. W. Raney Stanford

Governor Broughton called the meeting to order at 2:30 p.m., stating that the purpose of the meeting was to draft a bill to be introduced in the 1945 legislature to extend medical and hospital care in North Carolina and increase the facilities for the education of medical personnel at the University.

The meeting was then turned over to Mr. Clarence Poe, Chairman of the Governor's Commission, who read the bill. After much discussion and several changes in the bill, it was unanimously approved by the Executive Committee of the State Medical Society.

The meeting thereupon adjourned at 5:30 o'clock.

* * * *

This meeting was immediately followed by a meeting of the members of the Executive Committee, which was called to order by President Whitaker at 5:30 o'clock, in executive session.

Dr. Hubert B. Haywood, Chairman of the Legislative Committee, stated that the 48 osteopaths in North Carolina are demanding recognition from the 1945 legislature and asking that they be allowed to prescribe drugs in an emergency. It was the unanimous opinion of the Executive Committee that this is an entering wedge for the osteopaths to practice medicine in North Carolina, and inasmuch as they are demanding recognition on the Board of Medical Examiners the Executive Committee felt that there should be some change in the Medical Practice Act, certainly in regard to this phase of it.

Dr. M. D. Hill made a motion that the Secretary-Treasurer confer with the American Medical Association regarding the draft of a proposed law that will be suitable to North Carolina for the 1945 legislature, this draft to be mailed for study to the members of the Executive Committee, Legislative Committee, and Board of Medical Examiners. After this study has been made, President Whitaker is to call a meeting of the Executive Committee, the Legislative Committee, and the Board of Medical Examiners to discuss the proposed bill to be presented to the 1945 legislature. This motion was seconded by Dr. I. E. Shafer and unanimously carried.

Dr. Haywood also stated to the Executive Committee that the North Carolina Board of Nurse Examiners desires to eliminate the two physicians on the Board—namely, the one elected from the Medical Society and the one elected from the North Carolina Hospital Association. Motion was made by Dr. I. E. Shafer that the physician members of the Board of Nurse Examiners be retained. This motion was duly seconded and unanimously carried.

There being no further business, the meeting adjourned at 6:30 o'clock.

Roscoe D. McMillan, M.D.
Secretary

January 28, 1945

The Executive Committee and the Legislative Committee of the Medical Society of the State of North Carolina, at the call of the President of the Society, held a meeting at the Sir Walter Hotel, Raleigh, North Carolina, on Sunday, January 28, 1945, with the Society's Committee to Advise with Members of the North Carolina Hospital and Medical Care Commission and with the chairman and medical members of the North Carolina Hospital and Medical Care Commission.

The President of the Society, Dr. Paul F. Whitaker, presided. The meeting was called to order at 2 p.m., the following persons being present:

Members of Executive Committee:
- Dr. Paul F. Whitaker, President, Kinston
- Dr. Zack D. Owens, Second Vice President, Elizabeth City
- Dr. Roscoe D. McMillan, Secretary-Treasurer, Red Springs
- Dr. Paul Crumpler, Councilor Third District, Clinton
- Dr. F. L. Knight, Councilor Fifth District, Sanford
- Dr. M. D. Hill, Councilor Sixth District, Raleigh
- Dr. I. E. Shafer, Councilor Ninth District, Salisbury

Members of Legislative Committee:
- Dr. Hubert B. Haywood, Chairman, Raleigh
- Dr. W. M. Coppridge, Durham
- Dr. Donnell B. Cobb, Goldsboro

Members of Committee to Advise with Members of the North Carolina Hospital and Medical Care Commission:
- Dr. George L. Carrington, Burlington
- Dr. V. M. Hicks, Raleigh
- Dr. C. T. Smith, Rocky Mount
- Dr. T. L. Carter, Gatesville
- Dr. Erick Bell, Wilson
- Dr. Grady G. Dixon, Ayden
- Dr. C. F. Strosnider, Goldsboro
- Dr. M. D. Hill, Raleigh*
- Dr. I. E. Shafer, Salisbury*

Members of North Carolina Hospital and Medical Care Commission:
- Clarence Poe, D.S., Chairman, Raleigh
- Dr. Paul F. Whitaker, Kinston*
- Dr. Roscoe D. McMillan, Red Springs*
- Dr. W. Reece Berryhill, Chapel Hill
- Dr. Carl V. Reynolds, Raleigh
- Dr. G. M. Cooper, Raleigh
- Dr. Hubert B. Haywood, Raleigh†
- Dr. Donnell B. Cobb, Goldsboro†
- Dr. J. Buren Sidbury, Wilmington
- Dr. W. M. Coppridge, Durham†
- Dr. W. R. Stanford, Durham
- Hon. John W. Umstead, Jr., Chapel Hill (Member of North Carolina General Assembly)

* Also listed as member of Executive Committee.
† Also listed as member of Legislative Committee.

Others:

Hon. Frank P. Graham, President, University of North Carolina, Chapel Hill

Mr. W. D. Carmichael, Comptroller, University of North Carolina, Chapel Hill

Dr. W. H. Moore, Wilmington

President Whitaker stated that the object of the meeting was to consider certain proposals for adjustment of the legislative program of the North Carolina Hospital and Medical Care Commission and asked Dr. Poe, the Chairman of the Commission, to present the proposals.

Dr. Poe said that, because of the great demand for increased appropriations for nearly all departments of the state government, it had become necessary to reduce the amount which the Commission will request the General Assembly to appropriate for carrying out the Commission's program for the establishment of hospitals, the extension of hospital and medical care, and the expansion of the Medical School of the University of North Carolina from a two-year to a four-year school. The original proposals of the Hospital and Medical Care Commission and the new proposals were summarized by Dr. Poe as follows:

	Original Proposals	New Proposal
A. Amounts for enlarged hospital facilities in North Carolina		
1. Central hospital at U. N. C.	$3,660,000	$2,325,000
2. Other hospitals	$5,000,000	$2,500,000
	$8,660,000	$4,825,000
B. Policies to encourage hospital building—	Grants of 10 to 50 per cent to needy counties, varying with need	No grants of principal Complete grant of all interest Repayments of 5 per cent a year for twenty years (with extensions for cause)
C. Policies to help both hospitals and indigent patients— State to provide $1 a day	$500,000	$500,000
D. Additional building for four-year medical school	$175,000	$175,000
E. Support of four-year medical school—	Adequate amount	Adequate amount
F. Funds to help medical students to serve rural areas	$250,000	$150,000
G. Health in schools	$300,000(?)	$300,000(?)

Dr. Poe stated that the amount of the new proposal for the central hospital would provide for 400 beds instead of the 600 originally recommended by the Commission. He quoted Dr. W. Reece Berryhill, Dean of the University Medical School, as saying that a 400-bed hospital can provide 50 beds for psychiatric patients and that it would be possible to have a first-class medical school with a hospital of this size.

Dr. Poe discussed the question as to whether the $2,500,000 now proposed for other hospitals would be adequate and voiced his belief that, with this as a beginning, the benefits realized in the counties in which hospitals are built will be so great as to cause the people of the other counties themselves to seek further appropriations from the General Assembly for establishing other hospitals.

Dr. Poe then took up the matter of policies to encourage the building of hospitals and, while expressing his personal belief that there should be grants of principal to needy counties and that the Commission should try to get this part of the program through, made the point that a grant of all interest on a loan which is to be repaid at the rate of 5 per cent a year for twenty years is really a grant of 33⅓ per cent of the total. He suggested that if the amount of $2,500,000 is allowed for interest-free loans it might be possible to include a stipulation that the Commission might, with the approval of the Governor and the Council of State, make grants in cases of extreme need.

Dr. Poe closed his remarks by expressing his feeling that, through the work of the Medical Society and the Commission, the time has now come when a real advance can be made and that, beginning with the reduced program now, the state can continue to go forward until the whole of the original program is realized.

Dr. Hubert B. Haywood, Chairman of the Legislative Committee, said that his committee had been working with the Hospital and Medical Care Commission and that, in his opinion, the figures as given by Dr. Poe in the new proposal are the highest that it can be hoped will be approved by the state authorities at the present time.

President Whitaker, after thanking Dr. Poe for his report, said that probably the most important part of this program is the fact that the state is recognizing its responsibility for the care of the indigent sick in North Carolina.

Dr. C. T. Smith quoted Mr. J. Lyman Melvin, Superintendent of the Parkview Hospital, Rocky Mount, and a member of the Board of Trustees of the North Carolina Hospital Association, as saying that he had communicated with enough of the trustees of the Hospital Association to be able to say that they will accept the new plan.

Dr. Carl V. Reynolds, State Health Officer, stated that a bill now before Congress provides $100,000,000 for aid to the states and counties in the erection of hospitals, the minimum grant being 25 per cent and the maximum 75; and he expressed his belief that the bill will shortly be enacted into law and that thus Federal funds will soon be available.

The following motion was offered by Dr. I. E. Shafer: "Resolved, that we reiterate our endorsement of the full program of the North Carolina Hospital and Medical Care Commission but that, in view of the conditions reported by Dr. Poe, we accept and endorse, as a beginning, the adjusted program set forth by him; provided that, in counties or communities where especially serious need of hospital facilities is found to exist, the State Hospital Commission may make grants in lieu of interest-free loans for hospital construction, provided the reasons for such action are reported to and examined by the Governor and the Council of State and approved by them; and provided that in no case shall such a grant exceed 50 per cent of the cost of constructing the hospital involved; and provided further that not more than $1,000,000 of the $2,500,000 authorized for interest-free loans may be converted into grants as herein set forth; and

"Resolved, further, that our leaders be authorized to accept incidental adjustments or changes that do not materially affect the program in its broader principles."

This motion was seconded by Dr. Strosnider and Dr. Dixon, and was carried by a vote of eighteen to one.

Dr. T. L. Carter, who voted in opposition to the

motion, took the floor to explain his position and outlined his views as set forth in his article in the January issue of the **North Carolina Medical Journal**, stating that his opposition is to the proposed four-year medical school at the University. At the request of President Whitaker, Dr. Haywood gave the figures as to the number of doctors graduated each year from the two medical schools in North Carolina, stating that there is an annual deficit of doctors in the state, due to death and other causes. There was some further discussion by Dr. W. M. Coppridge, Dr. G. M. Cooper, and Dr. Carter.

The meeting then adjourned, at 5 p.m.

After the close of the meeting Secretary-Treasurer McMillan communicated with the following members of the Executive Committee by long-distance telephone, presenting to them the proposition as outlined by Dr. Poe; and each of them expressed himself as being in favor of accepting the new proposal:

W. H. Smith, M.D., First Vice President, Goldsboro
J. G. Matheson, M.D., Councilor First District, Ahoskie
John Cotten Tayloe, M.D., Councilor Second District, Washington
Newsom P. Battle, M.D., Councilor Fourth District, Rocky Mount
C. C. Orr, M.D., Councilor Tenth District, Asheville.

News Notes from the State Board of Health

Dr. T. F. Vestal, who for the past five years has been director of the Division of Industrial Hygiene of the State Board of Health, recently was made director of the Division of Tuberculosis Control—a new and much needed division of the State Board of Health.

Dr. Vestal now is in the process of setting up this division and its program. As director of tuberculosis control, he will be in charge of all tuberculosis case-finding work and will administer Federal funds appropriated recently for this purpose by the Bulwinkle Bill—a bill passed by Congress to set up a division of tuberculosis control in the United States Public Health Service. This new Federal division will deal not only with tuberculosis control on a national scale, but will give all possible aid to the states, both financially and otherwise.

Dr. Vestal will also administer any funds which may be appropriated later by the North Carolina General Assembly for tuberculosis control work in this state.

Dr. Vestal was succeeded as director of the Division of Industrial Hygiene by Dr. C. B. Davis, a native North Carolinian, who for some time has been in charge of the industrial hygiene program of the North Carolina Shipbuilding Company in Wilmington.

Dr. Davis was graduated from Wake Forest and from the University of Pennsylvania Medical School. After an internship in Philadelphia he became engaged in private practice in Wilmington and later in industrial hygiene work with the North Carolina Shipbuilding Company.

News Notes from the North Carolina Tuberculosis Association

North Carolina has led the way not only in the number of member institutions in the National Student Health Association, but also in establishing the first state-wide student health association. Leader in these developments has been Miss Jennie L. Douglass who is Secretary and a member of the Executive Council of the National Student Health Association. A two-day conference was recently held in Durham under the auspices of the North Carolina State College for Negroes and representatives came from a number of colleges, discussed a number of problems and formed this statewide student health association.

The next meeting of the National Student Health Association will be held at the North Carolina State College for Negroes in Durham sometime in April.

The National Social Hygiene Day Project, sponsored by this and other associations, was a success. Seven North Carolina Negro Colleges took part. St. Augustine's College won the fourth national prize and Johnson C. Smith University was given honorable mention.

The North Carolina Tuberculosis Association is vitally interested in the promotion of the work of this Association in North Carolina, having given both advisory service and financial aid to some of its projects.

* * * *

For the information and guidance of tuberculosis associations and as a service to health officers, sanatorium superintendents, physicians, social welfare and rehabilitation workers, lawyers and business heads concerned with workmen's compensation problems, the National Tuberculosis Association has undertaken the publication, state by state, of the full text of all the laws, rules and regulations relating to tuberculosis.

The task is a formidable one, involving the publication throughout the nation of approximately fifty volumes averaging eighty pages each.

When the North Carolina volume is completed, it will be made available through the North Carolina Tuberculosis Association to all those expressing a desire to have it.

The volume will be inexpensive and can be used as a reference for existing laws and as a basis in the formulation of model laws covering such problems as isolation and quarantine, sanatorium admissions, re-admissions and settlements, public health nursing services, and workmen's compensation and rehabilitation.

Moore County Medical Society

A meeting of the Moore County Medical Society was held on January 22. The treatment of venereal diseases was discussed, and it was decided to send all acutely infectious cases, so far as possible, to one of the Rapid Treatment Centers in order to cut down the spread of infection to men in the armed forces.

News Notes

Dr. V. L. Bigler of Albemarle died in the Medical College Hospital in Richmond on January 21.

* * * *

Dr. J. R. Gamble of Lincolnton died on January 26 in the Reeves Gamble Hospital, of which he was the founder and owner.

* * * *

Major Barnes Woodhall, MC, has been appointed as Consultant in Neurosurgery to The Surgeon General. He is now on duty at Walter Reed General Hospital in Washington, D. C. Major Woodhall received his M.D. degree from Johns Hopkins University. He was an assistant professor of surgery at the Duke University Medical School and Hospital, and prior to his entrance on active duty with the Army, he was chief of the neurological section, Ashford General Hospital, W. Va.

(BULLETIN BOARD CONTINUED ON PAGE 114)

AUXILIARY

The Auxiliary is now sponsoring three beds, one in each of the North Carolina Tuberculosis Sanatoria. As our "guests" we have three nurses, girls who are most grateful for the privilege of occupying an Auxiliary bed.

The Eastern Sanatorium patient writes, "I wish to express my deep appreciation to the Auxiliary for their kindness in making me a guest during my stay at the Sanatorium. Already the rest I have received has helped me considerably."

Our Sanatorium guest writes, "The courtesy extended me by the Auxiliary is one of the nicest things that has ever happened to me. Financially it has been a life saver and morally it has helped to keep my spirits high, to know there are people like the Auxiliary members who care for our welfare and are doing such a wonderful thing by giving the 'Free Beds'."

From Black Mountain our patient writes, "Thank you all for what you are doing for me. You don't know how much I appreciate it and I hope the Society will receive a blessing from the Lord by so doing."

A Christmas card from a former patient proudly announces that she is again working.

All of these girls would like to write each Auxiliary member, but that is impossible. They want, particularly at this time, to say "thank you" for the lovely Christmas provided them. Our nurse at Black Mountain had her room festooned with cards, the chair piled with gifts and several checks to complete the picture. May I thank each one of you for your thoughtfulness and generosity in helping these girls and in continuing the spirit of Christmas.

THELMA S. SAUNDERS

Vitamin Advertising and the Mead Johnson Policy

The present spectacle of vitamin advertising running riot in newspapers and magazines and via radio emphasizes the importance of the physician as a controlling agent in the use of vitamin products.

Mead Johnson & Company feel that vitamin therapy, like infant feeding, should be in the hands of the medical profession, and consequently refrain from exploiting vitamins to the public.

BOOK REVIEWS

Atlas of the Blood in Children. By Kenneth D. Blackfan, M.D., Late Thomas Rotch Professor of Pediatrics, Harvard Medical School; Late Physician-in-Chief, Infant's and Children's Hospital, Boston; and Louis K. Diamond, M.D., Assistant Professor of Pediatrics, Harvard Medical School; Visiting Physician and Hematologist, Infant's and Children's Hospital, Boston. With illustrations by C. Merrill Leister, M.D., Associate Pediatrician, St. Luke's Hospital, Bethlehem, Pa. 320 pages. Price, $12.00. New York: The Commonwealth Fund, 1944.

This is truly a magnificent volume. Although the authors have confined their work to children, many of the cases were followed into adulthood, and the book is equally valuable for the study of blood dyscrasias in adults. The variations from normal at different ages and the great lability of the blood picture in children under the influence of intercurrent diseases are stressed.

The illustrations are superb. The colors are unusually accurate and can be compared with stained slides in the laboratory more easily than can the majority of plates describing the blood. The authors have wisely chosen Wright's stained smears, since this is the stain commonly used in most laboratories. The text has been confined to a minimum. Case reports and charts of illustrative cases are freely used. An adequate bibliography is appended.

The volume should prove indispensable to internists as well as to pediatricians. This book could be reproduced only at many times its present cost except for the generous subsidization of the Commonwealth Fund. This Foundation should be warmly commended for enabling this contribution to be made widely available.

Military Medical Manuals. Manual of Clinical Mycology. By Norman F. Conant, Ph.D., Donald S. Martin, M.D., David T. Smith, M.D., Roger D. Baker, M.D., and J. Lamar Callaway, M.D., Duke University School of Medicine, Durham, N. C. 348 pages, with 148 illustrations. Price, $3.50. Philadelphia: W. B. Saunders Co., 1944.

This pocket-size volume of the series prepared under the auspices of the National Research Council is the best in its field. It is very practical in its approach. The clinical picture, pathology, immunology, and mycology of each disease are described by an expert in his field. The illustrations are superb and show the clinical lesions in patients and the fungi as isolated from the patients with the morphologic variations after culturing. Many of the diseases described may not now occur in this country, but this volume is written primarily for military use throughout the entire world. It is strongly recommended for all physicians who may come in contact with fungus diseases. The volume is very fittingly dedicated to the memory of Archie S. Woods of the John and Mary R. Markle Foundation, whose unusual interest as a layman has led to wide dissemination of knowledge concerning tropical and fungus diseases.

Textbook of General Surgery. By W. H. Cole and Robert Elman, in association with eighteen consulting authors. Ed. 4. 1118 pages. Price, $10.00. New York: D. Appleton-Century Company, Inc., 1944.

This text of thirty-three chapters accomplishes in a splendid way the object which its authors had in mind: to present a systematic survey of the field of surgery. General surgery, as well as gynecologic, urologic, thoracic, and war and catastrophe surgery, is very well covered in a concise manner. The book in general adheres to fundamental surgical principles, and is admirably suited as a text for the use of medical students, house officers, and men engaged in general practice. The opinions set forth in the text are all basically sound, and where a controversial subject is discussed the authors present several sides of the question with admirable lack of bias. Not the least virtue found in this text is the splendid bibliography at the end of each chapter.

Hydronephrosis and Pyelitis of Pregnancy. By H. E. Robertson, M.D., Section on Pathologic Anatomy, Mayo Clinic, Rochester, Minnesota. 332 pages with 11 illustrations. Price, $4.50. Philadelphia and London: W. B. Saunders Company, 1944.

In this monograph, Dr. Robertson has accomplished the monumental task of reviewing historically this extremely important subject. His purpose is to improve our understanding of this basic scientific problem by bringing together all the available information on the subject and reviewing the accomplishments of the past. He succeeds admirably in fulfilling this purpose, and this volume is the most complete reference work which has appeared on this subject.

The observations made on this phenomenon are presented in a chronological order, from those of Morgagni in his "Letters on the Seats and Causes of Diseases," published in 1769, to the most recent literature on the subject. Dr. Robertson's editorial comments in the form of footnotes appear throughout the volume and add immeasurably to its value.

The force of medical tradition is emphasized to all of us by Dr. Robertson's quotation of a statement from the first edition of DeLee's **Principles and Practice of Obstetrics**, which appeared in 1913: "The ureters, particularly the right, have been found dilated and filled with urine in about two-thirds of the gravidae coming to autopsy. This is caused by torsion, stretching or kinking of the ureters, due to the enlargement and dislocation of the pelvic organs, but not to compression, since the specific gravity of the pregnant uterus is about equal to that of the intestinal mass." This statement also appeared in the 1918, 1924, and 1928 editions of this book, with a reference to a paper by Luchs, which according to Dr. Robertson does not mention the subject. It has been quoted by numerous authors, and has colored our thinking in this problem during three decades.

Dr. Robertson largely permits us to draw our own conclusions from the mass of material he has brought together, and points out the need for further fundamental studies of this problem. A complete bibliography is included.

Dr. Robertson's monograph may well become the primary source book in this field.

A Textbook of Histology. By E. V. Cowdry, Professor of Anatomy, The School of Medicine, Washington University. Third edition. 426 pages, with 317 illustrations. Price, $7.00. Philadelphia: Lea and Febiger, 1944.

The third edition of Cowdry's **Histology** is a concise volume of information on physiological histology. The subject matter is discussed from the point of view of blood as the principal integrator of the body. All of the cells and intercellular substances and their manifold combinations into tissues and organs are discussed from this main thesis.

This volume may well serve as a guide for the writers of all textbooks for medical students. The subject matter is approached with a view of the over-all picture of the biology of a human being. Minutiae of technical methods and other detail which research men might desire are relegated to larger volumes on the subject and to the original experimental papers. This results in elimination of much subject matter and permits the continuity of vitalistic processes to permeate throughout the book. The correlation of the function and the structural composition of tissue is constantly emphasized to advantage in portraying the dynamic conception of living tissue.

The selection of material for illustrations is excellent. Photomicrographs of tissues in many diseases are used in pointing out cellular activity. Variations in tissue in different age group periods are shown clearly. The manner of reproduction of the fine photographs is a tribute to the artistry of the publisher.

Case Studies in the Psychopathology of Crime. Vol. 2. By Ben Karpman, M.D., Senior Physician and Psychotherapist, St. Elizabeth's Hospital, Washington, D. C. 738 pages. Price, $16.00. Washington, D. C.: Medical Science Press, 1944.

This book represents the second volume of a series of case studies of criminal psychopaths who were admitted for treatment to St. Elizabeth's Hospital in Washington, D. C., from federal penitentiaries. The sale of the book is restricted to those having a direct professional interest in medicolegal or social problems. It contains four intensive and detailed personality studies. The psychiatric approach is primarily an analytical one. However, it is distinguished from usual analytic literature by the fact that very little or no interpretation is offered by the psychiatrist, and the developmental difficulties are made clear through the patient's own history. The details are rarely brought in such intimacy to the average physician or social worker anywhere else in the literature and are of great importance in the understanding of behavior abnormalities. The cases dealt with in this book pertain to drug addiction, violation of the Mann Act, rape, and robbery. Although these difficulties are eventually dealt with in one way or another by the law, it must be obvious to every physician that these problems also belong in the field of medicine and frequently confront the physician.

The book is quite voluminous and hardly designed for quick reading by the general practitioner. To the psychiatrist, to the physician who is interested in underlying personality difficulties in connection with his treatment of patients, and to the social worker who frequently has to deal with the families of these patients, the book will be of great interest. The reader will be well repaid in terms of knowledge for the time invested in reading this book.

Etiology, Diagnosis and Treatment of Amebiasis. By Charles F. Craig, M.D., Colonel U. S. Army, retired. 332 pages. Price, $4.50. Baltimore: Williams & Wilkins Co., 1944.

The presence of American troops in regions where amebiasis is extremely common, and also the increasing realization that this disease is by no means confined to the tropics make Dr. Craig's new authoritative publication particularly timely.

The entire subject of amebiasis is brought up to date, with comprehensive, well written sections covering pathology, symptomatology, complications, diagnostic methods, and therapy; also included are the results of laboratory and animal experimentations.

There are many excellent illustrations and a valuable bibliography.

This book is of value to all students and practitioners of medicine, particularly to those of us in the South.

Ventures in Science of a Country Surgeon. By Arthur E. Hertzler, M.D. 304 pages. Price, $4.00. Halstead, Kansas, 1944.

Those doctors who enjoyed Dr. Hertzler's **The Horse and Buggy Doctor** will enjoy still more his latest venture into literature. The first book was written for the general public, the latter for doctors; and as Logan Clendening once said, doctor talk is the best talk there is. Here Dr. Hertzler reviews his life's work and is apparently well satisfied with it. He has every right to be, for he has accomplished far more than is given to most medical mortals to do. One wonders how one man could carry on the tremendous practice he has had, interest himself in research, and also find time to write.

Dr. Hertzler's writing reminds one much of Bernard Shaw. It is purposely egotistic—provocatively so. For example, in discussing his long crusade against the erroneous diagnosis of chronic appendicitis, he said that "Over a period of years every medical meeting was marked by papers dealing with chronic appendicitis. The pros and cons were equally divided, myself on one side and the rest on the other."

The temptation is to quote much of the book, for it is studded with most quotable phrases and sentences. It is not listed for the market, but information received by this reviewer is that a check for four dollars sent to Dr. Hertzler at Halstead, Kansas, will be sufficient to insure a copy.

Seventeenth Anniversary Issue of the *Harofe Haivri*

Volume II, 1944, seventeenth anniversary issue of the **Harofe Haivri**, edited by Moses Einhorn, M.D., has just made its appearance. Its contents are not confined to technical medical topics, but are divided into several sections covering a variety of related subjects.

In the medical section, the following subjects are discussed: "Cesarean Section (Its Uses and Abuses)" by Dr. H. J. Epstein and a discussion by Dr. A. J. Rongy, "Malaria in Public Health" by Dr. A. J. Levy, "Stricture of the Rectum" by Dr. E. Rapaport, "Cancer of the Skin" by Dr. O. L. Levin and Dr. H. T. Behrman and "The Painless and Bloodless Treatment of Calcified Bursitis" by Dr. J. Echtman.

Under the heading of Jews and Health, Dr. L. Wulman, organizer of the American branch of the OSE, presents a timely article entitled **OSE—Its Achievement and Plans for the Post-War Period.** The OSE originated in Russia, in the year 1912, and derives its name from the initials of the Russian words, Oschestvo Zdravoochranenia Evreev, which mean "Society for Safeguarding the Health of the Jews."

In the section on Personalia, Dr. Solomon R. Kagan offers an article entitled "Jews as Nobel Prize Winners in Medicine", among whom are discussed such outstanding physicians as Ehrlich, Metchnikoff, Barany, Willstaetter, Meyerhof, Landsteiner, Warburg, Loewi and Erlanger.

For further information, you may communicate with the editorial office of the **Harofe Haivri**, 983 Park Avenue, New York 28, New York.

BULLETIN BOARD

(CONTINUED FROM PAGE 111)

Ophthalmological Seminar

An Ophthalmological Seminar sponsored by Emory University and honoring the memory of Dr. Abner Wellborn Calhoun, first professor of ophthalmology of Emory University, will be held in Atlanta April 19-21. The guest speakers will be Dr. W. L. Benedict, Dr. John Dunnington, Dr. Harry Gradle, Dr. Parker Heath, Dr. Walter I. Lillie, Colonel Derrick Vail, and Dr. Frank Walsh. All those interested in ophthalmology are invited to attend as guests of Emory University.

American College of Surgeons Defers War Sessions

The American College of Surgeons has deferred for the time being its 1945 series of War Sessions, four of which were to have been held in February, according to an announcement by Dr. Irvin Abell, Chairman of the Board of Regents.

Cancellation of Nineteenth Annual Conference on Medical Service

The nineteenth annual session of the National Conference on Medical Service, scheduled for Sunday, February 11, 1945, at the Palmer House, Chicago, will not be held. This action is taken in compliance with a request received from the Office of Defense Transportation.

Spring Refresher Course in Otolaryngology

The fifth semi-annual refresher course in laryngology, rhinology and otology will be conducted by the University of Illinois, College of Medicine at the College in Chicago, March 26 to 31 inclusive, 1945. While the course will be largely didactic, some clinical instruction will be included. This course is intended primarily for ear, nose and throat specialists. As the registration is limited to thirty, applications will be considered in the order in which they are received. The fee is $50.00. When writing for application please give details concerning school and year of graduation, and past training and experience.

Address—Dr. A. R. Hollender, Chairman, Refresher Course Committee, Department of Otolaryngology, University of Illinois, College of Medicine, 1853 West Polk Street, Chicago 12, Illinois.

Meharry Medical College

The Board of Trustees of Meharry Medical College announces the appointment of Dr. M. Don Clawson as president of Meharry Medical College succeeding Dr. Edward L. Turner. The Board of Trustees also announces the appointment of Dr. Murray C. Brown as Director of Medical Education.

Russian War Relief, Inc.

Since the start of the war there have been few cases of polio in the Soviet Union, Dr. Sofia Markina, director of the Dzerzhinsky Children's Hospital in Moscow, told Leo Gruliow, Russian War Relief representative, and Lillian Hellman, American author and playwright, who made a tour of this 400-bed hospital, outfitted with American blankets, sheets, pajamas and medical supplies sent by the relief agency.

The virtual disappearance of poliomyelitis among Russian children was attributed by Dr. Markina to the wide dispersal of these children during the evacuation which took place early in the war.

The relief representative, who cabled this information to the agency's headquarters in New York City also reported a decline of rheumatic fever among children, a decrease which Dr. Markina feels is due to the lack of protein content in Russia's wartime diet. This dietary insufficiency, Dr. Markina pointed out, has, however, created other serious nutritional cases requiring sanatorium treatment. Citing an absence of epidemics as a whole, she indicated as a special wartime problem the rise in malaria carried by children who returned from evacuation points in Central Asia.

The staff of the Dzerzhinsky Children's Hospital, under Dr. Markina's supervision, is now making a study of wartime effects on the health of children.

* * * *

The American people in 1944 contributed almost $23,000,000 in cash and goods to Russian War Relief, making a total of $42,246.240 received by the agency since its inception a little over three years ago.

Medical and Surgical Relief Committee

Mr. Arthur Kunzinger, treasurer of the Medical and Surgical Relief Committee recently announced that for the six month period ending December 31, 1944, the Committee's donations to 21 countries including the United States, amounted to $43,669.87.

The territory covered by the Medical and Surgical Relief Committee has increased as the number of liberated countries has increased, and contributions now reach France and Italy. United States tops the list of beneficiaries with $16,386.13, the U.S. Army $1,025.40, and various civilian hospitals and welfare agencies the balance of $11,818.95. The greatest number of shipments for this period went to China and India, while the most valuable single contribution amounting to $4,951.76 went to L'Entre Aide Francaise for the relief of French children.

The Medical and Surgical Relief Committee is distinguished by its adherence to two principles: (1) No authentic appeal is ever turned down, and (2) medical aid is the only form in which aid is given. Contributions of medical, surgical and dental supplies and instruments will soon reach the $700,000 mark. The exact figure to date is $690,715.60.

American Foundation for Tropical Medicine

A gold medal and an honorarium of $500 for outstanding service in the field of tropical medicine were presented to Rear Admiral Edward R. Stitt (retired), former Surgeon General of the United States Navy, by the American Foundation for Tropical Medicine.

The presentation was made on behalf of the Foundation by Col. Richard Pearson Strong (M.C.), director of tropical medicine at the Army Medical School, Washington, D. C., and recipient of last year's award.

The medal and honorarium were established in 1944 through a gift by the Winthrop Chemical Company. Known as the Richard Pearson Medal and bearing a profile of Dr. Strong on its face, it is to be awarded annually for distinguished service in tropical medicine.

INDEX TO ADVERTISERS

Banner Elk Rest Home 116
Broadoaks Sanatorium XXXI
Burroughs Wellcome & Co. ..... XVI - XX
Camp, S. H. Co. XXXIII
Charlotte Eye, Ear, and Throat Hospital XXVIII
Cheplin Laboratories XXIV
Commercial Solvent ..... VI - VII
Cook County Graduate School of Medicine XXIX
Dairy Council XXI
Eli Lilly and Company ..... Insert and XVIII
Glenwood Park Sanitarium XXX
Charles C. Haskell and Company V
Holland-Rantos Co., Inc. VIII
Inter-Ocean Casualty Co. XXVI
M & R Laboratories XXII
Mead Johnson & Company XXXVI
Parke, Davis and Company ..... XXXIV - XXXV
William Perske XXVII
Philip Morris & Co., Ltd., Inc. XII
Physicians Casualty Assn.
Physicians Health Assn. XXIX
Pinebluff Sanitarium III
Powers and Anderson, Inc. III
R. J. Reynolds Tobacco Co. IX
Saint Albans Sanatorium XXVII
Schering Corp. XI
Schieffelin & Co. XXVI
Julius Schmid, Inc. XV
Searle, G. T. & Co. XIX
Smith, Kline & French ..... XVII - XXV
Spencer Corsets XXIX
E. R. Squibb XIV
Stuart Circle Hospital XXXI
Thompson Homestead School 116
Tucker Hospital XXX
Upjohn Co. XIII
Wachtel's, Inc. XXVI
Westbrook Sanatorium XXVIII
Winchester Surgical Supply Co.
Winchester-Ritch Surgical Co. XXI
Winthrop Chemical Co., Inc. XXXII
White Laboratory XXIII
Wyeth, John ..... Insert and II

Mary Loveless Wins First Marcelle Award

Dr. Jonathan Forman, Executive Director of the Seventh Annual Forum on Allergy, announced that the Marcelle Award with its cash prize of three hundred fifty dollars has been won by Mary Loveless, M.D., New York City, for her attempt to correlate thermo-stabile antibodies with clinical results and the consequent use of "Booster-doses" which may well shorten and simplify our treatment of hay fever. The second prize in the Marcelle Award went to Charles F. Code, M.D., of the Section on Clinical Physiology of the Mayo Foundation at Rochester, Minnesota. This prize of one hundred fifty dollars was awarded for his studies of the role of histamine in the production of anaphylactic and allergic reactions. A. R. Rich, M.D., of the Johns Hopkins University and his associates received honorable mention for their work on serum sickness and periarteritis, as did Frank Simon, M.D., of Louisville, Kentucky, for his studies of the allergens in human dander.

For several years now the Annual Forums On Allergy have given a gold medal in recognition of a life's work in the field. This year the Gold Medal went to Milton J. Rosenau, Chapel Hill, North Carolina, Charles Wilder Professor of Preventive Medicine and Hygiene, Emeritus, Harvard University, and Professor of Epidemiology, School of Medicine, University of North Carolina. Through the generosity of Marcelle's Cosmetics, Inc., the Forum was able to give a first prize this year of three hundred fifty dollars and a second prize of one hundred fifty dollars in recognition of the most meritorious contributions to Clinical Allergy during the past year.

Medical Men Honored for Contribution to Safe Childbirth

Two medical men, from diverse fields, have been honored by the Planned Parenthood Federation of America for their part in making childbirth more healthful, safe and secure for American mothers.

Two $500 cash awards of the Albert and Mary Lasker Foundation were presented to Dr. John MacLeod, of the Department of Anatomy, Cornell University Medical College and to Dr. Felix J. Underwood, executive officer of the Mississippi State Board of Health, at the 24th Annual Meeting Dinner in the Waldorf-Astoria, New York, on January 24.

Dr. Richard Pierson, one of New York's leading obstetricians and chairman of the Federation's Medical Committee presented the cash prizes, with a plaque and scroll to the two men. The award was given to Dr. MacLeod for his scientific research in the motility of human sperm cells—which should prove valuable, after further study, in the correction of infertility and the control of fertility in human beings. Dr. Underwood was cited for his state's expanded maternal health program which includes planned parenthood as an integral part of its public health service.

Proteins in Soy Milk Approximate Utilization of Egg Protein

Investigations recently conducted at Wayne University in Detroit have shown the soy proteins in Mull-Soy to have an average true digestibility of 89.6 per cent and an average biological value for maintenance of 95.6 per cent, compared with egg protein as 100 per cent.

The findings of this study using adult human subjects were published in a recent issue of the Journal of Nutrition, 28:209,1944. The method of Murlin and associates was used to determine biological values.

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The penicillin laboratories of Wyeth Incorporated, Reichel Division, at West Chester and Kimberton, Pa., have been selected as ideal for the study of penicillin manufacturing methods by Dr. Jesuino de Albuquerque, Secretary of Public Health of the Federal District of Rio de Janeiro, Brazil, who is in this country gathering data for the establishment of a municipal penicillin laboratory in Rio.

In cooperation with the Wyeth staff, arrangements have been made for a group of Brazilian chemists and bacteriologists to study the production and standardization of penicillin at Wyeth. The Wyeth organization has made the facilities of its Philadelphia, West Chester and Kimberton laboratories available to the Brazilian scientists for this purpose.

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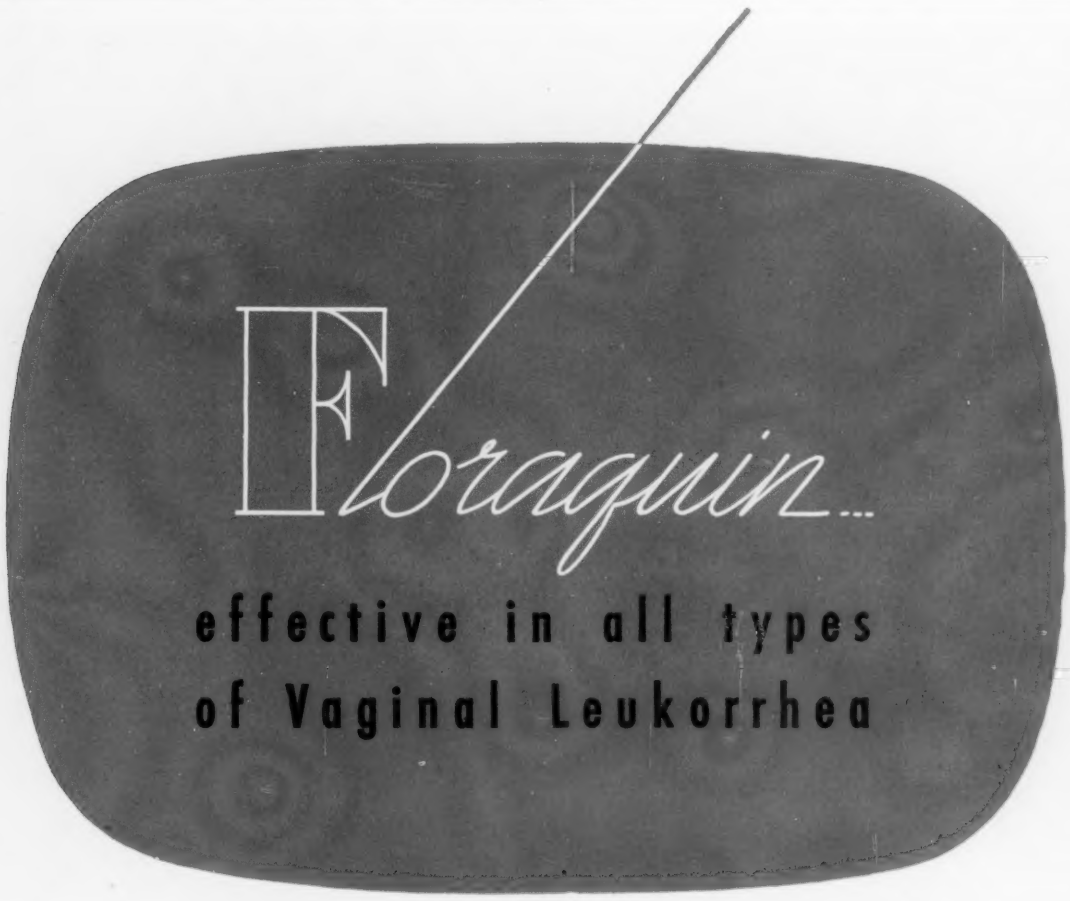

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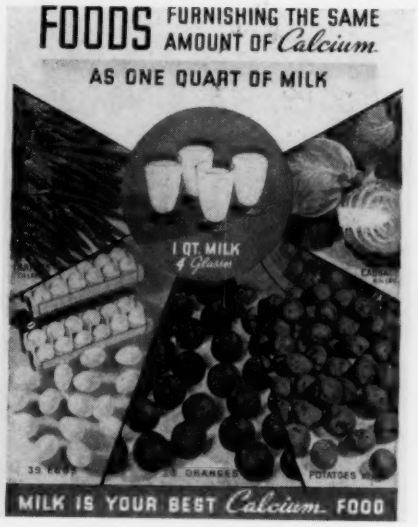

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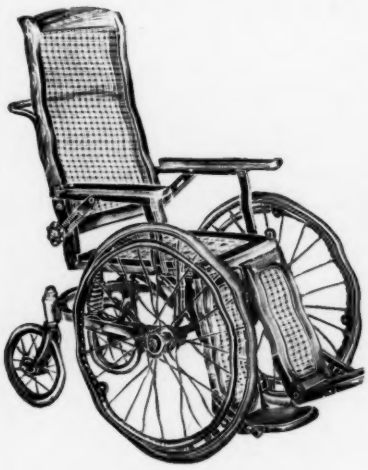

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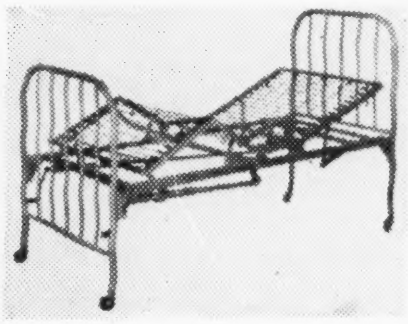

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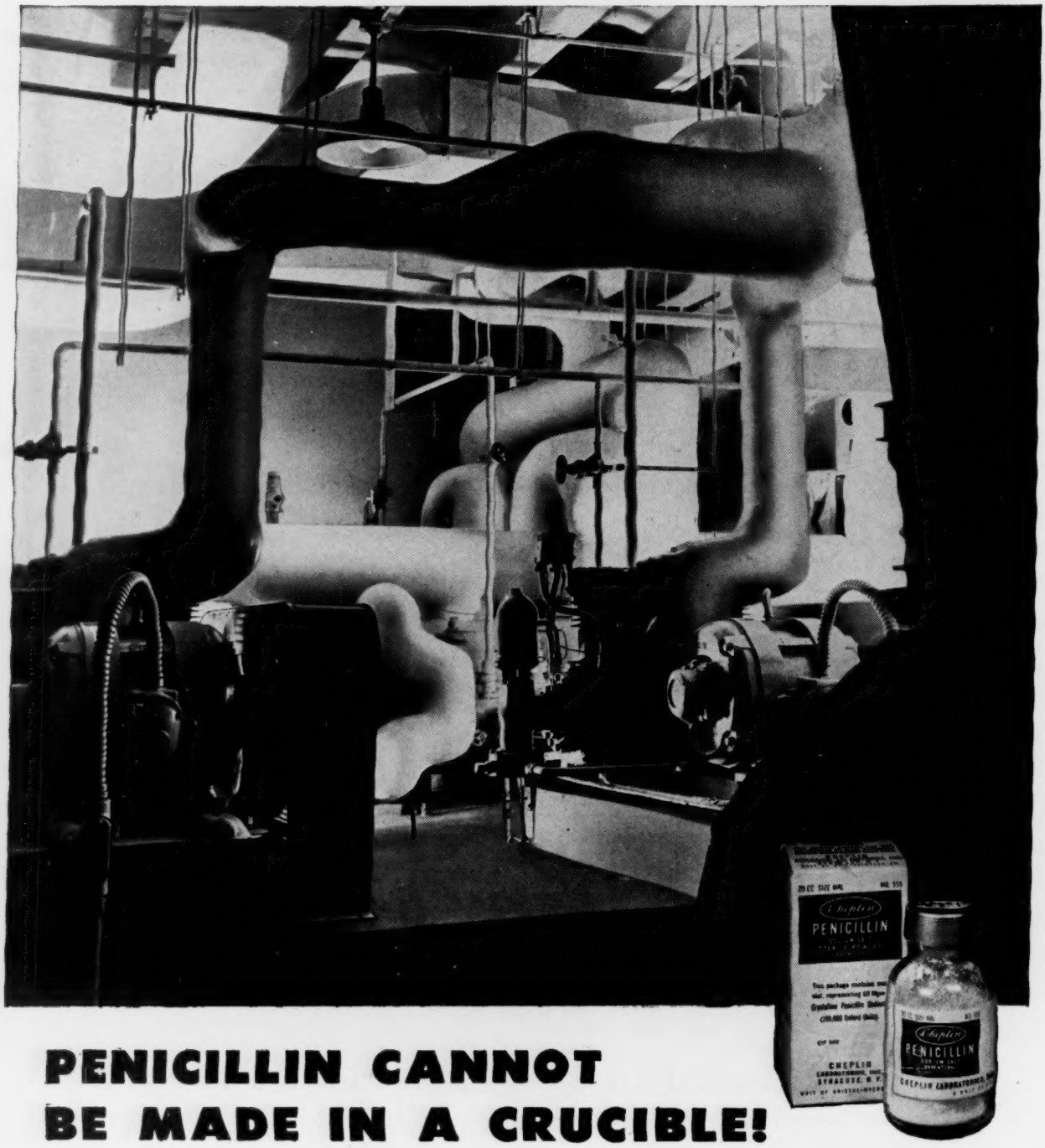

PENICILLIN CANNOT BE MADE IN A CRUCIBLE!

Bring back Paracelsus and his crucibles today...show him the clinical picture of *Penicillin*...take him on a trip through a great Penicillin plant like that of Cheplin Laboratories. What would he think? Your guess is as good as ours!

Just as strides in clinical medicine have been unmeasurable since Paracelsus' time, so too have been the strides in mass-manufacture and plant-investment. In the Cheplin plant at Syracuse, for instance, there are alone thirty miles of pipe needed to make this new "wonder-drug."

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For the symptomatic relief of sinusitis

In relieving the discomfort which almost invariably accompanies acute sinusitis, the striking success of Benzedrine Inhaler, N.N.R., is as logical as it is gratifying:—

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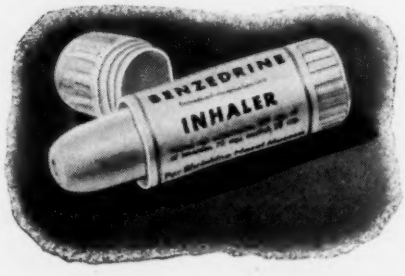

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Benzedrine Inhaler

Each tube is packed with racemic amphetamine, S.K.F., 200 mg; oil of lavender, 60 mg.; menthol, 10 mg.

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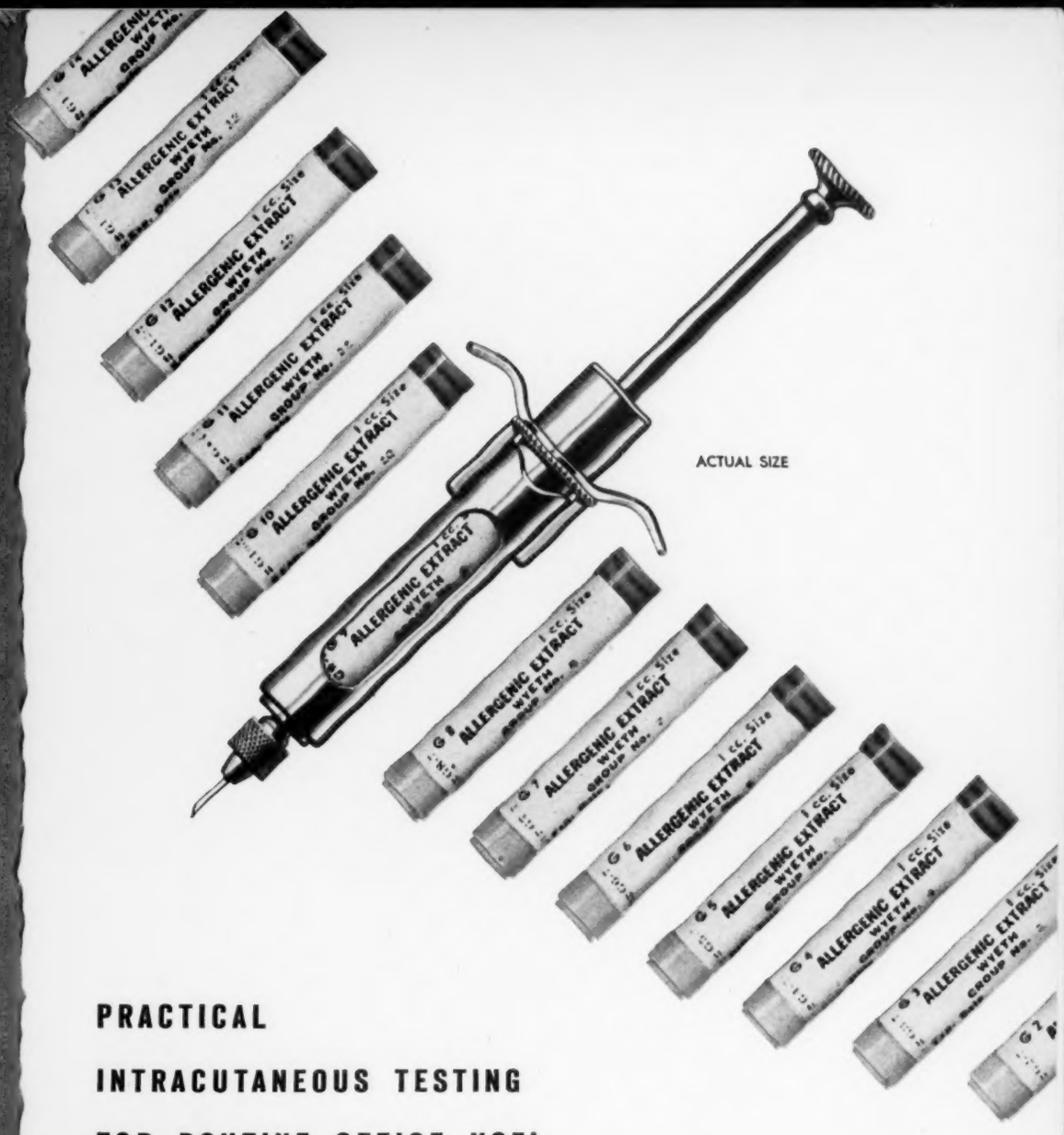
ALLERGY DIAGNOSIS



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NO TIME-CONSUMING DILUTION of allergen is needed, for Tubex are available filled with a sterile solution of the specific allergen in dilution suitable for immediate injection.

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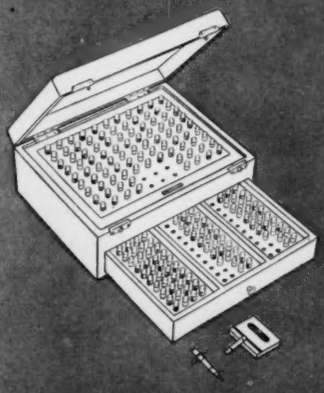
TESTS MAY BE READ WITHIN TEN MINUTES, or about one-third the time required for the development of a positive reaction by the scratch method.

REICHEL DIVISION • WYETH INCORPORATED • PHILADELPHIA 3, PA.

*Reg. U. S. Pat. Office



Complete! Wyeth allergen testing set in handsome cabinet, includes breech-loading Tubex syringe, more than 200 Tubex of essential allergens, one dozen needles and useful accessories.

ALLERGENIC TESTING SET

Wyeth

Petrogalar
REG U.S. PAT. OFF.
Wyeth

Longer and busier work days, with a shortage of materials and skilled help—these and other worries that increase the tension of the war years play havoc with those health habits so essential to well-being.

Petrogalar gently, persistently, *safely* helps to establish "habit time" for bowel movement. An aqueous suspension of pure mineral oil each 100 cc. of which contains 65 cc. pure mineral oil suspended in an aqueous jelly, Petrogalar is evenly disseminated throughout the bowel, effectively penetrating and softening hard, dry feces, resulting in comfortable elimination with no straining and no discomfort.

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Petrogalar Laboratories, Inc., Division
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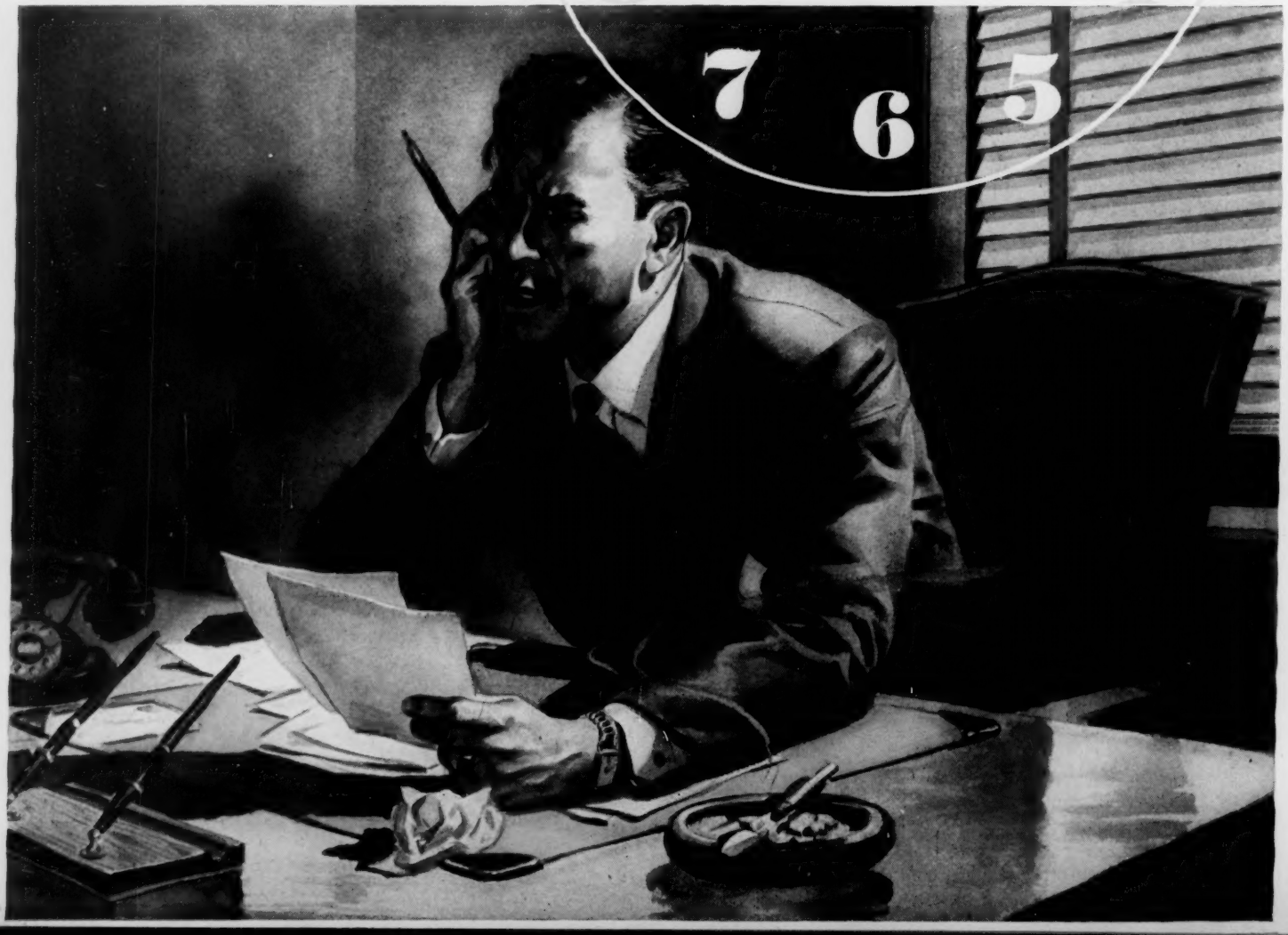
Petrogalar

helps establish "Habit Time"



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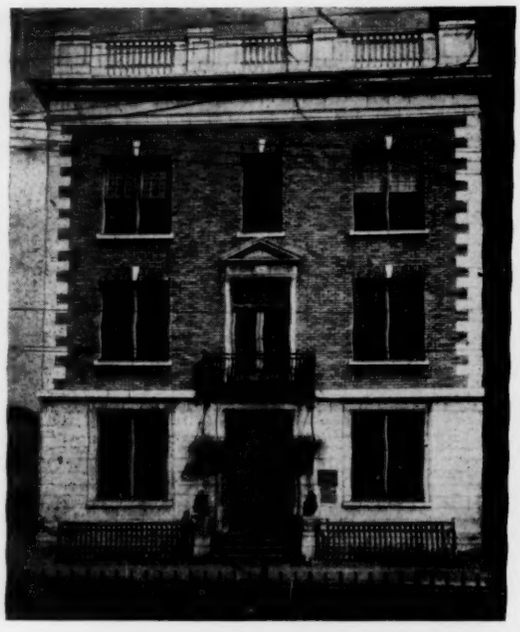

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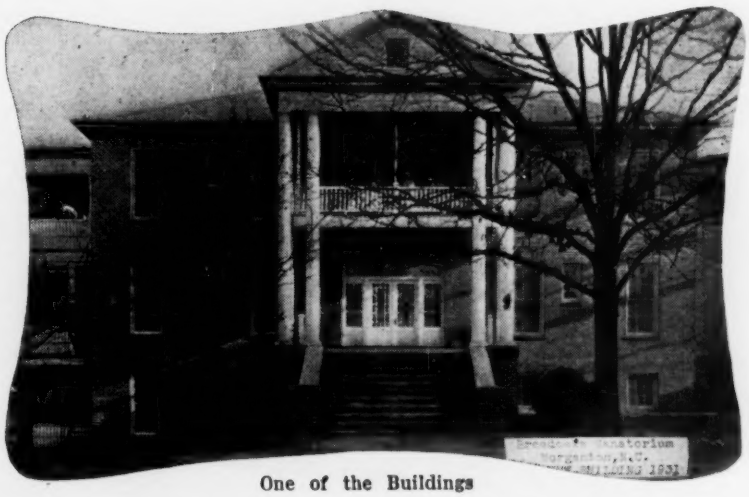

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A PRIVATE Hospital for the treatment of **NERVOUS AND MENTAL DISEASES, INEBRIETY AND DRUG HABITS.** A home for permanent care of selected cases of chronic nervous and mental diseases.

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MILK DIFFUSIBLE *Vitamin* D PREPARATION

DRISDOL in Propylene Glycol makes it possible to secure the benefits obtainable from combining vitamin D with the daily milk ration. This preparation is simple, convenient and easy to use, and relatively little is required for prophylaxis and treatment of rickets—*only two drops daily.*

does not float on milk
does not adhere to bottle
does not have a fishy taste or odor

Drisdol in Propylene Glycol—10,000 units per Gram—is available in bottles containing 5 cc. and 50 cc. A special dropper delivering 250 U.S.P. vitamin D units per drop is supplied with each bottle.

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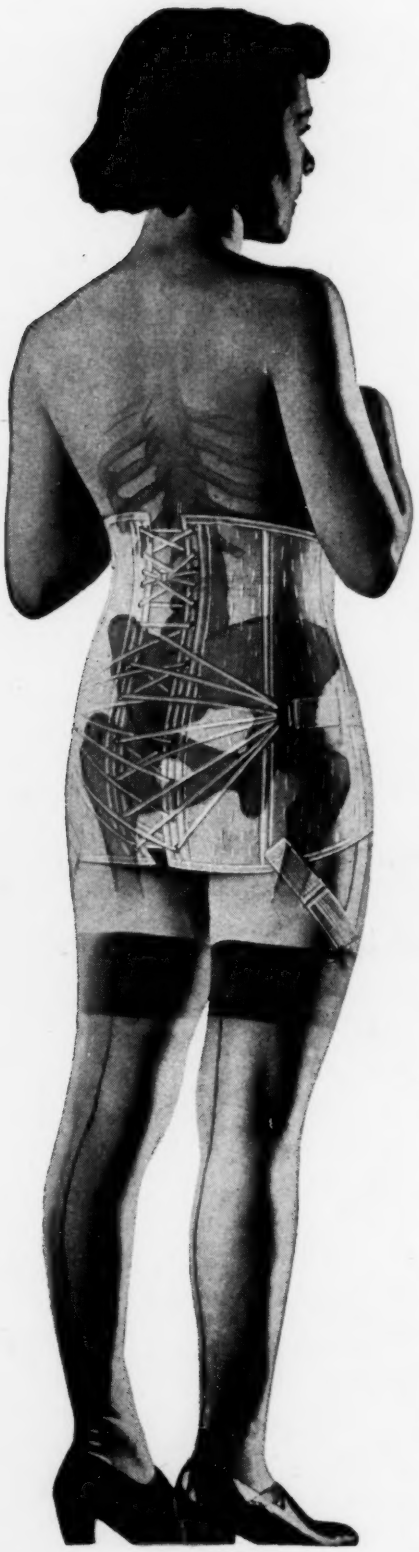

Patient of thin type of build — skeleton indrawn

ANATOMICAL SUPPORT
for faulty
BODY MECHANICS

In conditions of faulty body mechanics, the nonuse of the abdominal muscles allows the pelvis to rotate downward and forward, bringing the sacrum up and back. There results an increased forward lumbar curve with the articular facets of the lumbar spine crowded together in the back. The dorsal spine curves backward with compression of the dorsal intervertebral discs and the cervical spine curves forward with the articular facets in this region closer together. Therefore, chronic strain of the muscles, ligaments and joints of the spine and pelvis occurs.

Camp Anatomical Supports have an adjustment by means of which their lower sections can be evenly and accurately brought about the major portion of the bony pelvis. When the pelvis is thus steadied, the patient can contract the abdominal muscles with ease and then with slight movement straighten the upper back.

Relieving back strain and fatigue, due to faulty body mechanics is a feature of the Camp Support illustrated, and other types for Prenatal, Postnatal, Postoperative, Pendulous Abdomen, Visceroptosis, Nephroptosis, Hernia and Orthopedic conditions.

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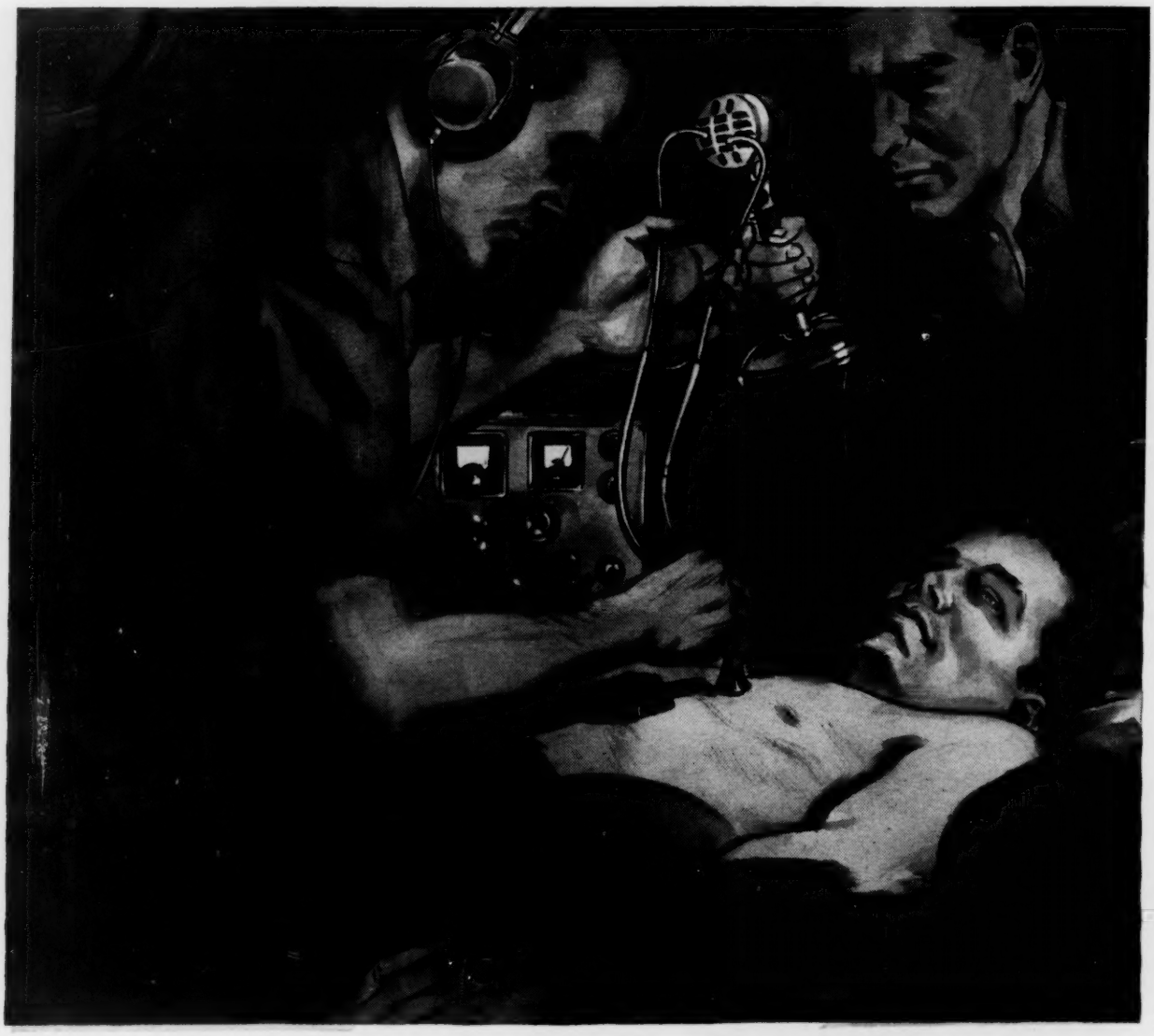

The details of this dramatic story were reported in daily newspapers on December 6, 1944—a tribute to the skill and ingenuity of the physicians in our Armed Forces.

RÂLES by RADIO

"Your man has an asthmatic attack . . . wrap him in blankets with hot water bottles and give him an injection of Adrenalin Chloride"

Spanning hundreds of miles of ocean, these life-saving directions of a Navy doctor in Hawaii were carried by radio to a small vessel "somewhere in the Pacific" on which a seaman lay unconscious. A stethoscope over the patient's chest with ear pieces pressed close to the microphone had made it possible for the physician to hear the breath sounds and heartbeat in Honolulu.

Thus in war, as in peace, Adrenalin Chloride is the first thought of the physician for the prompt relief of asthmatic paroxysms.

Its ability to relax spasms of bronchial musculature, to stimulate the heart with increase in cardiac output, to raise systolic arterial pressure and widen pulse pressure, and to constrict blood vessels of the skin gives Adrenalin a dynamic and diversified therapeutic action.

In addition to its use in bronchial asthma, Adrenalin (epinephrine) is widely employed as a hemostatic, as a vasoconstrictor in vascular engorgement of the nasal passages, to prolong the effect of local anesthetics, and as an aid to resuscitation in shock and anesthesia accidents.

Adrenalin

1:100 Solution
1:1000 Solution

Parke, Davis & Company
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It Can Happen Here

Example of severe rickets in a sunny clime.

LEST WE FORGET—we who are of the vitamin D era—severe rickets is not yet eradicated, and moderate and mild rickets are still prevalent. Here is a white child, supposedly well fed, if judged by weight alone, a farm child apparently living out of doors a good deal. This boy was reared in a state having a latitude between 37° and 42°, where the average amount of fall and winter sunshine is *equal to that in the major portion of the United States.* And yet such stigmata of rickets as *genu varum* and the quadratic head are plain evidence that rickets does occur under these conditions.

How much more likely, then, that rickets will develop among city-bred children who live under a smokepall for a large part of each year. True, vitamin D is more or less routinely prescribed nowadays for infants. But is the antiricketic routinely administered in the home? Does the child refuse it? Is it given in some unstandardized form, purchased from a false sense of economy because the physician did not specify the kind?

A uniformly potent source of vitamin D such as Oleum Percomorphum, administered regularly in proper dosage, can do more than protect against the gross visible deformities of rickets. It may prevent hidden but nonetheless serious malformations of the chest and the pelvis and will aid in promoting good dentition. Because the dosage is measured in *drops*, Oleum Percomorphum is well taken and well tolerated by infants and growing children.

EXIGENCY OF WAR

Oleum Percomorphum 50% is now known as Oleum Percomorphum with other Fish Liver Oils and Viosterol. The potency remains the same; namely, 60,000 vitamin A units and 8,500 vitamin D units per gram. It consists of the liver oils of percomorph fishes, viosterol, and fish liver oils, a source of vitamins A and D in which not more than 50% of the vitamin D content is furnished by viosterol.

Supplied in 10 c.c. and 50 c.c. bottles; and as capsules in bottles containing 50 and 250.

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